PAINT and VARNISH Production

THE TECHNICAL MAGAZINE FOR MANUFACTURERS OF PAINT, VARNISH, LACQUER AND OTHER SYNTHETIC FINISHES

APRIL
1955

HIGH PERFORMANCE AT LOW TEMPERATURES MAKES WALLPOL 9301 A SUPERIOR PVA EMULSION

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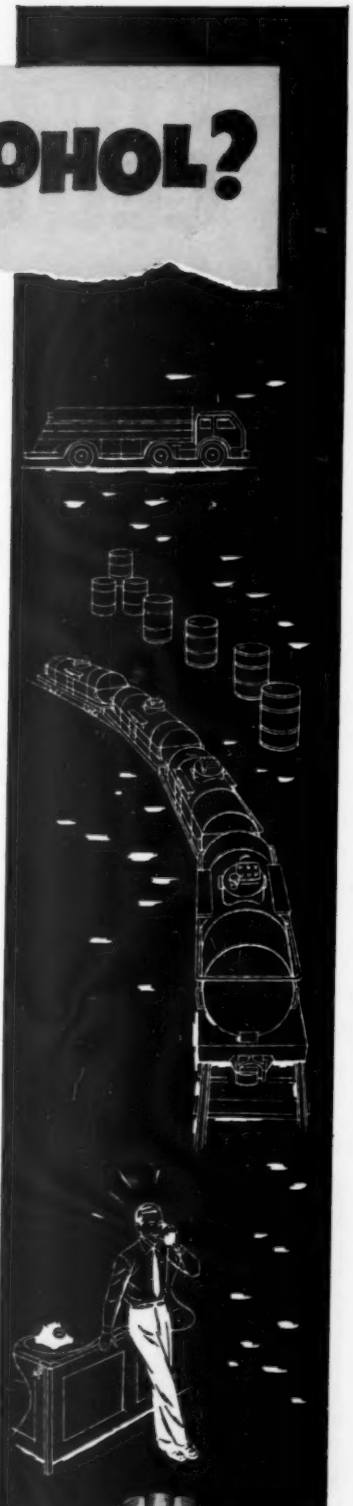

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(REG. U.S. PATENT OFFICE)

Formerly PAINT and VARNISH PRODUCTION MANAGER
(Established in 1910 as The Paint and Varnish Record)

VOL 45 APRIL, 1955 NO. 5

NEXT ISSUE

One of the vexing problems encountered in the painting of galvanized iron and steel is the difficulty with adhesion of the paint film. The May issue will carry an article entitled, "New Red Lead Paints for Galvanized Surfaces" in which the author discusses surface preparation, formulations, coating thickness as important factors in overcoming this difficulty.

FEATURES

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Editorial Comment

April, 1955

Chemical Progress Week

THE first Chemical Progress Week was held May 17-22, 1954. The purpose of the Week, one part of the Industry's continuing public relations program, was to bring the contributions of the chemical industry to the public in terms of their daily life. The theme and slogan for the Week was "A Better America Through Chemical Progress."

Three outstanding features of the program, according to the Manufacturing Chemists' Association, Inc., were:

1 - It brought the story of the chemical industry to people through their own communities. It was told to them by their neighbors associated with the industry.

2 - It provided an opportunity for concerted action. For one week the entire industry told its story at the same time. The cumulative impact of this effort was considerably greater than anything done singly.

3 - The program gave every member company, regardless of size, an opportunity to participate in an MCA activity of benefit to everyone.

The report further states that one of the principal barriers confronting the chemical industry in its effort to establish its significance in the minds of the American people is the lack of a specific identity such as that enjoyed by the automotive or steel industries. A concerted industry effort such as Chemical Progress Week gathers all members of the industry together under the banner of a common purpose regardless of diversity of product. This concerted national effort provides a common denominator for all chemical companies whether they produce aspirin or zinc dust.

This year Chemical Progress Week will be celebrated nationally May 16-21.

It cannot be denied that the chemical industry is a dynamic factor in the continuous growth and expansion of the paint and varnish industry. Without chemical development, technological progress in the paint industry would be stifled.

Thus, it is essential that the paint industry lend its fullest support to this important chemical event.

Do-It-Yourselfer Cannot Do All

LAST month in this column we commented on the fact that the "do-it-yourself" movement has actually been an asset to the painting contractor. Further evidence of this was a recent announcement that the New Jersey Council, Painting and Decorating Contractors of America will reserve a prominent booth at the state-wide Do-It-Yourself Exposition to be held May 6-14 at the West Orange Armory.

The reason given for this action was that statistics compiled both by the PDCA in Chicago and the National Paint, Varnish and Lacquer Association reveal that within the field of painting, decorating, and wallpapering the "do-it-yourself" movement has helped the qualified professional contractor in several ways such as: saving the responsible contractor the embarrassment of declining small jobs; fostered in the public an appreciation of the protective factors of good painting; and the psychological values of color styling both at home and at work.

Thus, the New Jersey Council thought it prudent to have a booth at this Do-It-Yourself Exposition in order to advise the home owner what methods and equipment to use and what safety precautions to take in his painting and decorating chores. In addition, a list of member contractors on whom the home owner may rely for handling the more difficult sections, or to finish the job should the "do-it-yourselfer" become interrupted will be available.

It is quite evident that there are certain things the "do-it-yourselfer" cannot do. Recognizing this fact, the contractor can, through this direct contact, convince the "do-it-yourselfer" that in many instances, only experience and training will result in a satisfactory and economical job.

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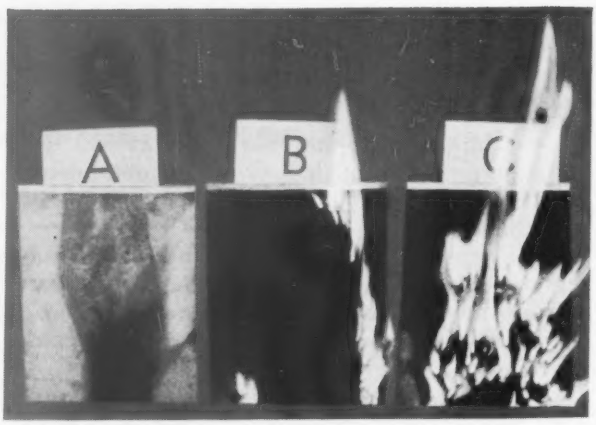

FLAME RETARDANCY TEST. 3 lacquers were formulated using same basic formula with exception of plasticizer. In Case A, it was Celluflex CEF (tris β-chloroethyl phosphate); Case B, tricresyl phosphate; Case C, dibutyl phthalate.

Lacquers were sprayed on panels, then ignited for 7 seconds. Upon removal of flame, Panel B and C continued to burn but Panel A (Celluflex CEF lacquer) extinguished itself within 2 seconds!

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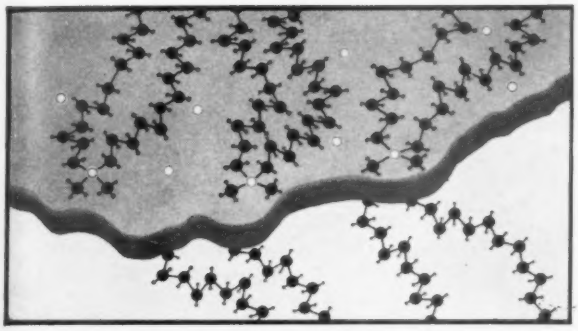

Diagram magnifies by millions a *BENTONE* flake portion. It shows ten of the hydrocarbon chains responsible for high film strength of *BENTONE* gelled paints. On each flake, there are hundreds of these chains.

In vehicles of the type used for exterior primers and top coats, *BENTONE* 34 gels develop unusually high film strength. The strong bond is established by some 900 long hydrocarbon chains on each surface of each two-sided colloidal *BENTONE* 34 flake. The bond is retained on drying.

Through its bodying action, this versatile gelling agent, *BENTONE* 34, also aids pigment suspension and package characteristics in primers. In top coats, *BENTONE* 34 prevents undue penetration and flooding, promotes color uniformity, broadens the color range obtainable from a single blending base. Durability and application are improved, too.

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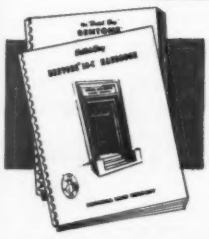

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Formulation and incorporation suggestions and properties of the *DUTCH BOY BENTONES* are detailed in 32-page *BENTONE* 18-C and 84-page *BENTONE* 34 Handbooks. If you don't yet have copies, write. Ask for the *BEN-A-GEL* Brochure, too.

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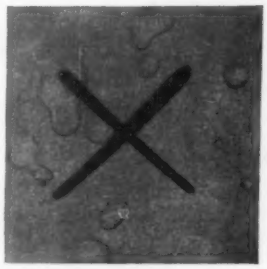

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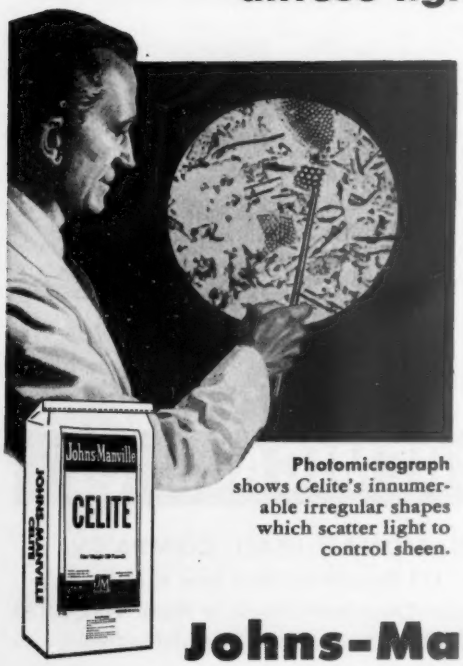

Photomicrograph shows Celite's innumerable irregular shapes which scatter light to control sheen.

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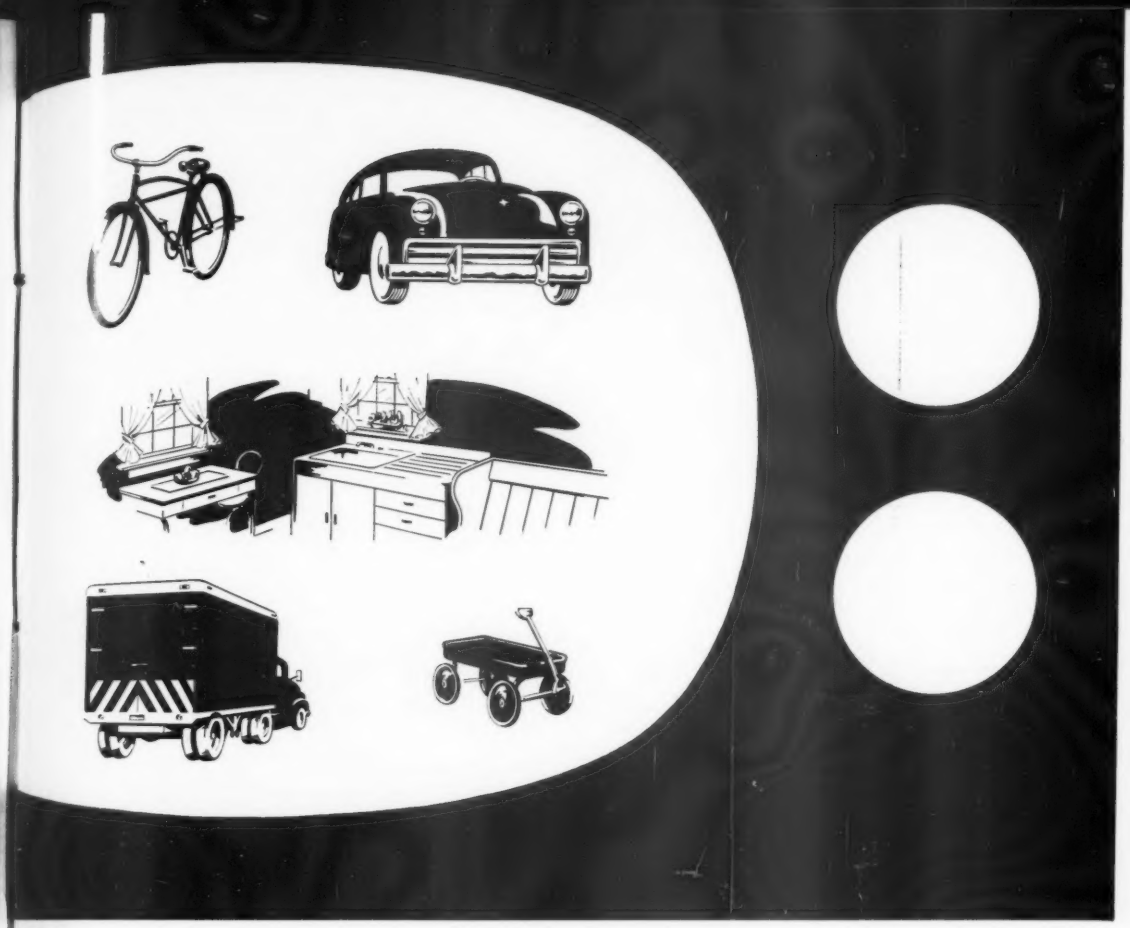

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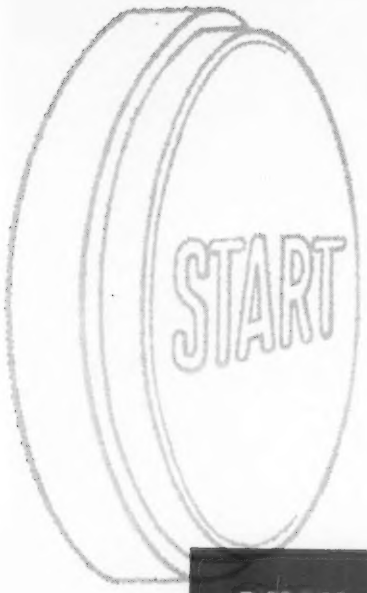

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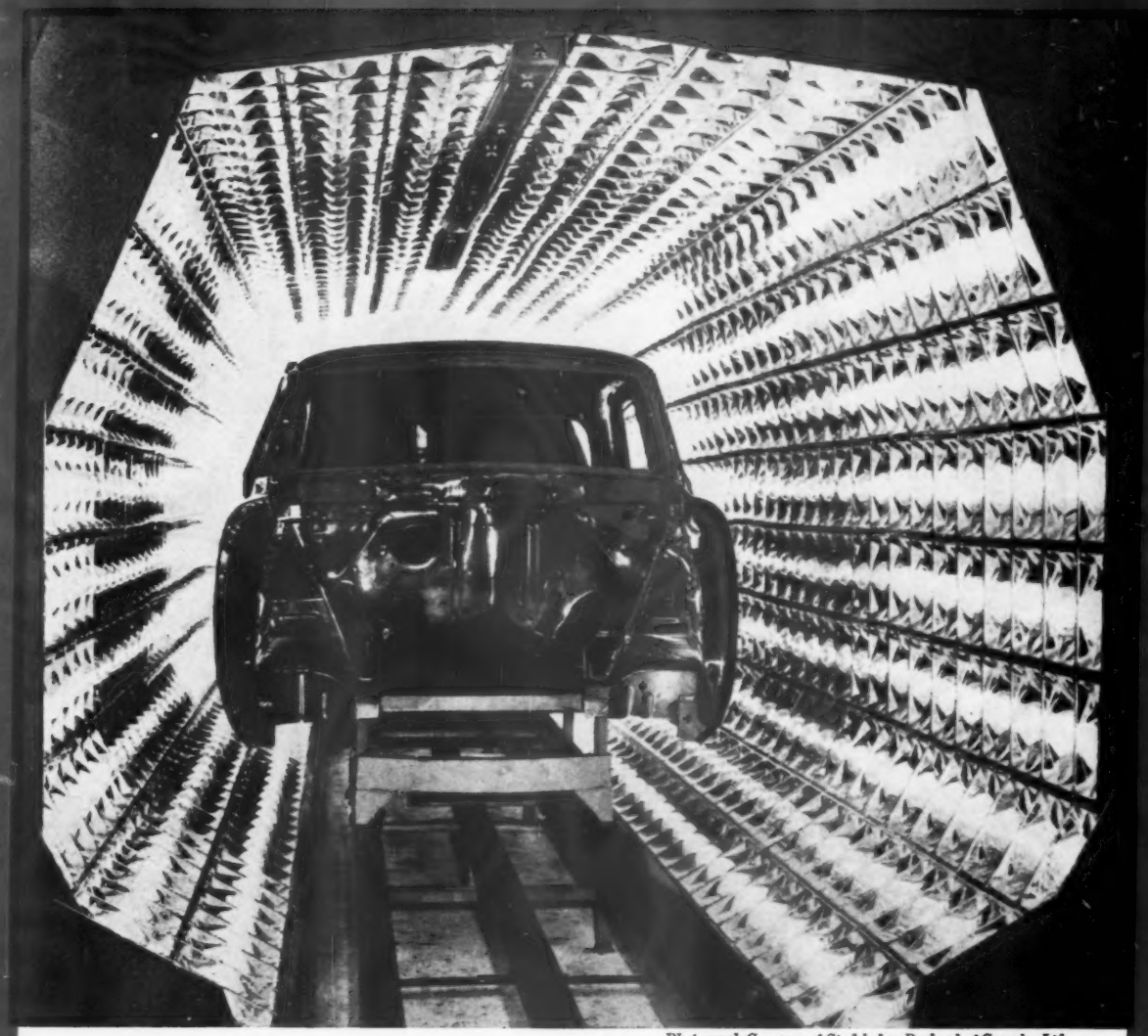

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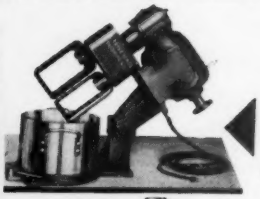

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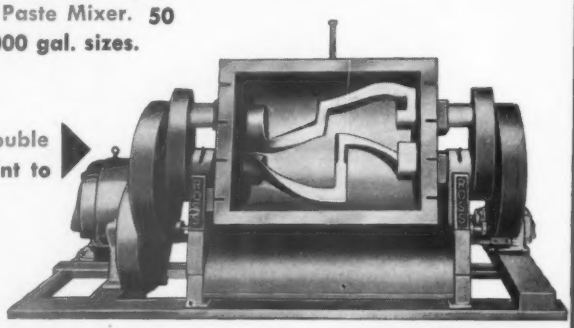

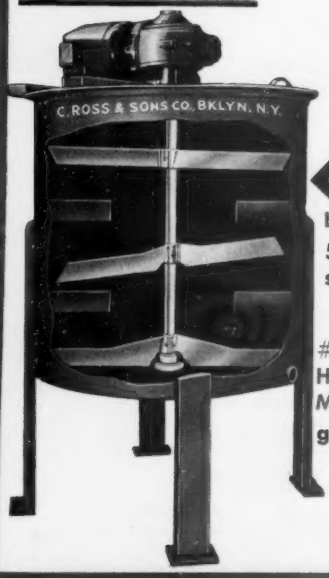

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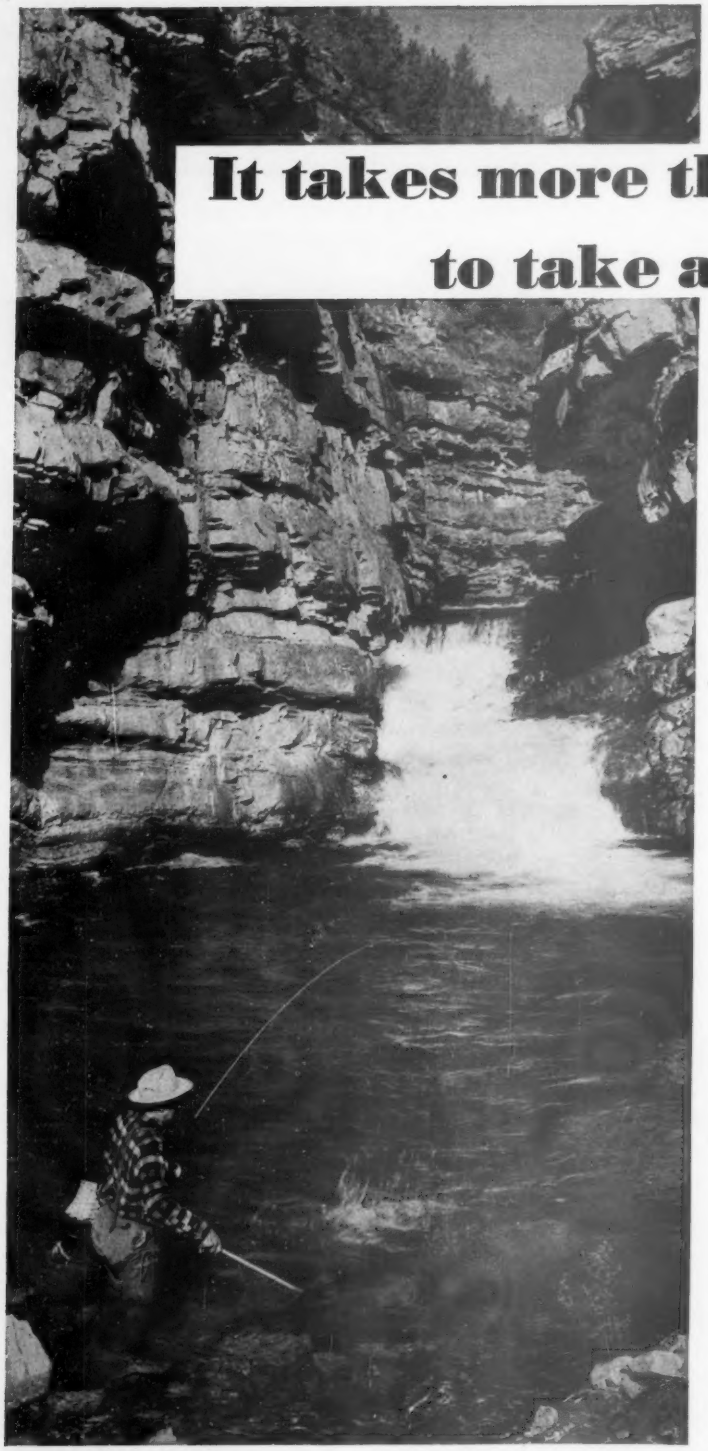

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RESYN 12K-51 DATA

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pH—4-5
Particle Size—Mostly under one micron
Viscosity—About 2000 cp

Film Properties

Free films of Resyn 12K-51 have a tensile strength of 2,200 psi. They will stretch as much as three times their length without breaking. Flexibility is equivalent to about 10% plasticizer on ordinary PVAc solids. And flexibility is permanent—no migration or evaporation embrittles the film on aging.

Binding power is significantly higher than ordinary PVAc, permitting higher pigment : resin ratios with improved physical properties. And as shown by standard scrub tests, water resistance is far superior. Resyn 12K-51 films withstand about 500 wet rubs, while ordinary post-plasticized PVAc films fail in the range of 50 rubs or less.

A broad variety of interior and exterior vinyl paints can easily be made with Resyn 12K-51 in regular paint equipment, with high hourly outputs. Formulas and technical help may be obtained by writing or calling your nearest National laboratory or office.

OLD, CHALKY COATINGS ON CEMENT CAUSE LOOSENING OF VINYL FILMS

Should Be Removed or Treated Before Painting

Even though vinyl paints withstand an unusual amount of abuse, trouble normally can be expected, as with other base paints, if the surfaces are not first properly prepared. One of the most common causes of trouble, according to reports from the field, is the practice of applying fresh vinyl coatings over old coatings of cement paint.

Samples of vinyl films taken from repainted buildings on which older paint surfaces were not removed have been studied in National's laboratory. Although the vinyl paint film itself was completely satisfactory, examination of the underside of the loosened films revealed heavy layers of old cement paint, indicating that loss of adhesion can result from substrate failure rather than film failure. This points up the need for firm, clean surfaces to insure the permanency of vinyl coatings.

National's paint chemists have concluded that only a thorough and proper preparation of chalking-type paint surfaces gives an adequate base for a lasting coat of vinyl paint. Old cement paint can be removed with a wire brush, or preferably by sandblasting down to the original unpainted substrate. If either of these alone is not practical, wire brushing followed by a penetrating oil sealer may be used to bind the powdery surface into a reasonably firm substrate to which vinyl paints will satisfactorily adhere. However, on surfaces to which many coats of cement paints have been applied, a check should be made to insure that the penetrating primer has actually penetrated deeply enough to insure adequate binding of the powdery material.

DATA ON FREEZE-THAW STABILITY

Freezing in cold weather of vinyl paints—during shipment, storage or in the painter's possession—need not be a problem. Experimental work in National's laboratories indicates the following:

1. The use of approximately 30 pounds of ethylene glycol per 100 gallons of paint is effective in imparting freeze-thaw (F/T) stability to most paints.

2. Diethylene glycol appears to be almost as effective as ethylene glycol, but cost considerations favor ethylene glycol.

3. The replacement of ethylene glycol with other glycols (excluding diethylene glycol) is not nearly as effective in obtaining repeated F/T stability.

4. The use of approximately 30 lbs./100 gallons of a combination of Cellosolve and diethylene glycol is also satisfactory for F/T stability, but the odor of Cellosolve is a drawback.

5. The use of solvents such as odorless mineral spirits to replace the glycol does not give satisfactory F/T stability.

The use of ethylene glycol has been found to result in little or no change in viscosity in most formulas, and neither pigment flocculation nor resin coagulation have been observed.

If a mildewcide is used in the formula, its effect on F/T stability should be checked. The addition of some mildewcides directly to the formula sometimes results in the loss of F/T stability. On the other hand, the incorporation of the same mildewcide to the pigment paste prior to grinding may cause no adverse effect.

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A definitely Acicular type with a lower oil absorption, but chemically identical with AZO ZZZ-11 and AZO ZZZ-22

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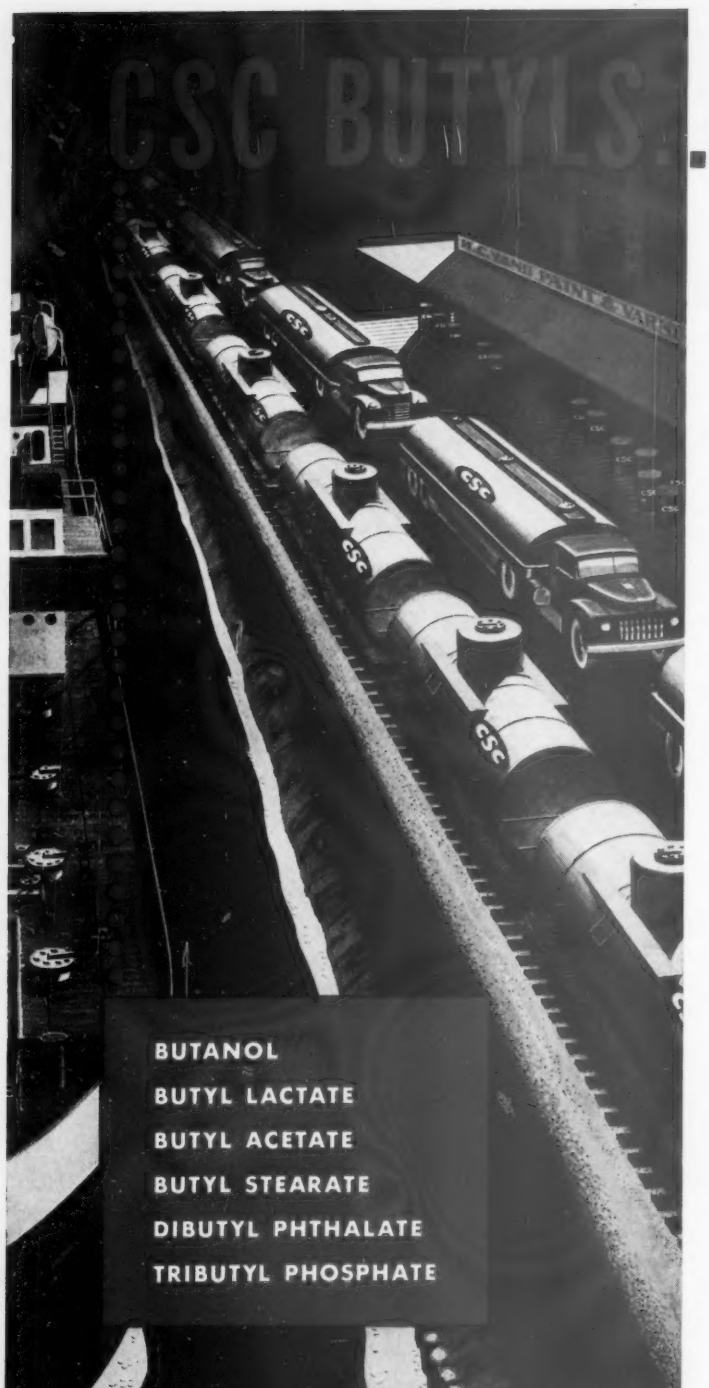

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INDUSTRIAL CHEMICALS

RESINOUS POLYOL

Dow Resin 622, containing a number of hydroxyl groups, can be esterified to form drying oil type coatings

THE cornerstone of the paint industry is and has been the group of materials which we know as vegetable drying oils. These oils in their raw form are used largely in paints, particularly exterior paints. They are esters of glycerine with 18 carbon fatty acids containing from 1-3 double bonds. These naturally occurring oils can be heat bodied in order to increase their viscosity, gloss, water resistance, hardness, etc. I will not attempt at this time to go into the complex and controversial chemistry involved in the heat bodying of oils, but I believe there is pretty good acceptance of the basic fact that the heat bodying of drying oils proceeds through the dimerization of the unsaturated fatty acids present in the oil. When we body a drying oil, we, therefore, are in effect producing a type of alkyd resin. The naturally occurring glycerine is the tri-hydric component. The dimerized fatty acids prepared in situ are the dibasic acids and the unpolymerized fatty acids comprise the drying part of the molecule. We can look upon heat bodied drying oils, therefore, as the first member of a series of upgraded drying oils wherein the mono-functional drying oil fatty acids are attached to a complex alcohol which in this case is composed of glycerine molecules tied together with dimerized fatty acids.

The next members of the upgraded drying oils family can be considered the group of drying oil modified alkyd resins wherein the backbone of the molecule again is a complex alcohol composed of glycerine or pentaerythritol linked together with dibasic acids such as phthalic anhydride. On this complex alcohol backbone are attached the mono-functional unsaturated fatty acids.

In recent years there have been introduced other types of polyhydroxy resin structures which can function as the backbone of a modified oil type molecule. The first one of these to achieve commercial stature was the family of epoxy resins prepared by combining Bisphenol A and epichlorohydrin. Such resins are now available from a number of commercial sources, and they have achieved considerable success in the coatings field as preformed polyhydroxy backbones on which can be attached the various mono-functional unsaturated drying oil fatty acids. In looking at the epoxy group of resins in this fashion the epoxy group can be considered to be equivalent to two hydroxyl groups. Under esterification conditions each epoxy group will esterify two drying oil fatty acid molecules just as if it were composed of two hydroxyls. As is well known, the epoxy resin fatty acid esters produce drying oil type finishes outstanding for their adhesion, chemical resistance and abrasion resistance.

Polyhydroxy Resin

The topic of my discussion this evening is a new addition to this latest group of polyhydroxy resin backbones. A type of resin structure containing a number of hydroxyl groups which can be esterified to form drying oil type coatings possessing outstanding adhesion, chemical resistance and abrasion resistance. This material is Dow Resin 622.

This paper was prepared by R. B. Drubel, A. L. Ciprtano, and W. A. Henson, Coatings Technical Service, The Dow Chemical Co. It was presented by Mr. Henson at the February 9th meeting of the Vehicle Manufacturers' Group of the N. Y. Paint and Varnish and Lacquer Assoc.

PHYSICAL PROPERTIES OF DOW RESIN 622

PHYSICAL APPEARANCE	HARD, BRITTLE, AMBER COLORED SOLID
COLOR (GARDNER-50% SOLUTION IN DOWANOL 33-B)	5-6
SOFTENING POINT	57°C (MIN)
SPECIFIC GRAVITY	1.297
WT PER GALLON, POUNDS	10.8
REFRACTIVE INDEX AT 20°C.	1.604
EQUIVALENT WEIGHT*	152

* GRAMS OF RESIN REQUIRED TO COMPLETELY ESTERIFY ONE MOL. OF MONOBASIC ACID, e.g. 280 GRAMS C_{18} FATTY ACID.

Table I

In Table I are listed some physical properties of Dow Resin 622. It is a hard, brittle, amber colored resin. The color is excellent, relatively speaking, being superior to many resins based on phenolic condensates. An important aspect of this excellent resin color is the highly satisfactory solution and film color of the corresponding fatty acid esters.

Dow Resin 622 possesses only limited solubility in most solvents as described in Table II. Although aromatic solvents such as xylene or toluene are not true solvents for this material, blends of toluene or xylene with alcohols, e.g. butanol, isopropylalcohol, completely solubilize the resin. Dowanols generally have been found to be excellent solvents for Dow Resin 622.

Preparation of Esters

Dow Resin 622 esters are prepared in much the same manner as alkyd resins. A typical laboratory procedure for the preparation of these esters is as follows:

1. Charge Dow Resin 622, fatty acids to a three neck flask equipped with agitator, temperature control, water removal trap and nitrogen or carbon dioxide gas inlet.
2. Fill water trap with xylene or mineral spirits. (A slight excess of solvent is allowed to mix with the resin and fatty acids to facilitate water removal.)
3. Blanket reactants with inert gas and apply heat.

SOLUBILITY* OF DOW RESIN 622

SOLVENTS	SOLUBILITY
ACETONE	SOLUBLE
METHYL ETHYL KETONE	INSOLUBLE
METHYL ISOBUTYL KETONE	INSOLUBLE
ETHYL ACETATE	INSOLUBLE
N-BUTYL ACETATE	INSOLUBLE
DOWANOL 7	SOLUBLE
DOWANOL 8	SOLUBLE
DOWANOL 16	SOLUBLE
DOWANOL 17	SOLUBLE
DOWANOL 33-B	SOLUBLE
DOWANOL 50-B	SOLUBLE
DOWANOL 62-B	SOLUBLE
V M & P NAPHTHA	INSOLUBLE
XYLENE	INSOLUBLE
TOLUENE	INSOLUBLE
TOLUENE : BUTANOL (1:1)	SOLUBLE
TOLUENE : ISOPROPYLALCOHOL (1:1)	SOLUBLE
N-BUTANOL	INSOLUBLE
ISOPROPYL ALCOHOL	INSOLUBLE

* SOLUBILITY DETERMINED AT 50% SOLIDS BY WEIGHT

Table II

4. When temperature reaches 150°C, start agitation and increase heat to 240°C.

5. Acid numbers are taken periodically and after 2 hours the acid number is normally less than one.

6. Cool and thin in mineral spirits or other suitable solvents.

Dow Resin 622 esterifies readily and quickly to low acid values. As shown in Figure 1, compositions containing as much as 0.9 mol of fatty acids per mol of resin, esterify to an acid value of approximately 1.0 in about 2.5 hours. Short esterification times result in light colored esters and at the same time may increase production capacity.

Dow Resin 622 esters prepared by fusion method in the absence of an azeotrope solvent are equally satisfactory. As a general rule, fusion cooks require slightly longer esterification times and result in somewhat darker colored esters.

Properties of Esters

Table III describes some film properties of Dow Resin 622 esters compared to vehicles based on epoxy, pure phenolic and alkyd resins. The Dow Resin 622 esters and the controls were chosen on the basis of known general properties and their potentially competitive nature for general coatings use.

The effect of the fatty acid component on the film properties of Dow Resin 622 esters is quite evident from this study. The three esters shown of dehydrated castor acids, linseed and soya fatty acids follow a rather normal pattern for oil-modified vehicles in their differences in physical and chemical resistance properties. The dehydrated castor oil fatty acid ester is obviously superior in both the physical and chemical resistance properties shown. The linseed and soya counterparts appear in about the order one would expect.

The best of the Dow Resin 622 esters shown, when compared to the epoxy resin at the oil length chosen, appears to be quite comparable in properties, being slightly superior in abrasion resistance but slightly poorer in drying time and initial hardness. The longer oil phenolics generally used as exterior spar varnishes, showed longer drying times and lower hardness compared to the Dow Resin 622 esters, but the combination of phenolic and tung oil manifested itself in superior alkali and water resistance. The alkyd behaved, comparatively, as might be expected, to give good dry, medium hardness and poor alkali and water resistance. On

COMPARATIVE FILM PROPERTIES OF DOW RESIN 622 FATTY ACID ESTERS

COMPOSITION	DRY HARD *	SWARD HARDNESS 24 HRS	SWARD HARDNESS 1 WK	FLEXIBILITY 1/8"	ALKALI RESISTANCE ** 1%	ALKALI RESISTANCE ** 5%	*** ABRASION RESISTANCE	TWO WEEKS H_2O IMMERSION
52% DOW RESIN 622 48% D.C.O. ACIDS	8 HOURS	26%	33%	EXCELLENT	3 WKS.	48 HRS.	0.022 GMS.	SLIGHT HAZE
52% DOW RESIN 622 48% LINSEED ACIDS	8 HOURS	24%	33%	EXCELLENT	1 WK.	20 HRS.	0.045 GMS.	SLIGHT HAZE
52% DOW RESIN 622 48% SOYBEAN ACIDS	8 HOURS	19%	22%	EXCELLENT	6 DAYS	15 HRS.	0.065 GMS.	SLIGHT HAZE
48% EPOXY RESIN 52% LINSEED ACIDS	6 HOURS	33%	35%	EXCELLENT	3 WKS.	48 HRS.	0.035 GMS.	SLIGHT HAZE
110 GALS. PURE PHENOLIC C.W.O. VARNISH	10 HOURS	15%	20%	EXCELLENT	3 WKS.	60 HRS.	0.43 GMS.	CLEAR
56% LINSEED OIL PHTHALIC ALKYD	7 HOURS	20%	24%	EXCELLENT	48 HRS.	4 HRS.	0.055 GMS.	BAD HAZE
COMMERCIAL - PURE PHENOLIC C.W.O. LINSEED SPAR VARNISH	10 HOURS	13%	22%	EXCELLENT	3 WKS.	72 HRS.	0.043 GMS.	VERY SLIGHT HAZE

* 0.5% Pb, .05% Co

** TIME TO FAILURE

*** TABER ABRASIVE - WT. LOSS/300 REV (CS-17 WHEEL)

Table III

ESTERIFICATION RATE OF TYPICAL DOW RESIN 622 FATTY ACID ESTERS

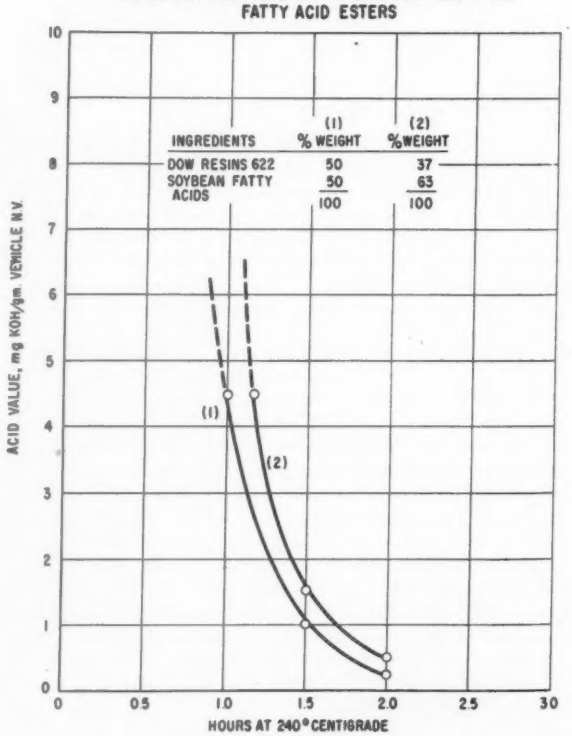

Figure 1

the basis of this study, the Dow Resin 622 esters can be characterized as possessing good drying and hardness properties combined with excellent abrasion resistance and highly desirable alkali and water resistance.

Obviously, in addition to the effect of the type of fatty acids used, the concentration of acids plays a significant role in the final film properties. As the concentration of fatty acids is varied one would obtain the expected differences in the physical and chemical resistance properties.

Observations made in a study of the physical properties of Dow Resin 622 esters suggested that these esters might not follow the resin formulation guideposts used for other resin types, from the standpoint of type and concentration of acids to obtain certain physical properties. The short oil esters, for example, show impact resistance and flexibility far superior to other hard resin types and consequently may be practical in areas where currently longer oil types must be used.

Fatty acid esters of Dow Resin 622 are compatible with most liquid and solid film forming resins. Linseed and soybean esters of Dow Resin 622 have been found to be compatible with rosin, polymerized and hydrogenated rosin, rosin ester, pure, and rosin modified phenolic resins, urea and melamine formaldehyde resins and alkyd resins of varying oil length. Modifying agents were blended at 35, 50 and 65% by weight of the total non-volatile composition. The importance of this broad compatibility is in the possible upgrading of existing vehicles by cold cut modification to give improved chemical and physical properties.

A unique property of Dow Resin 622 esters is their excellent solubility in aliphatic petroleum hydrocarbons. Esters containing as much as 65% resin and 35% fatty acids are completely soluble in mineral spirits (35 K.B.), while esters containing less than 45% resin possess infinite solubility in odorless (26 K.B.) mineral spirits. Illustrated in Figure 2 are several ester compositions varying in Dow Resin 622 content and solubility characteristics. In Figure 3 are listed some Dow Resin 622 esters which typify the excellent solubility and corresponding viscosities when thinned in low K.B. thinners. As expected, viscosities of the esters thinned in 26 K.B. mineral spirits were generally greater than those esters thinned in 31 K.B. mineral spirits.

Methods of Altering Viscosity

In the formulation of finishes for the many diversified specifications in the industrial and trade sales fields, the viscosity and non-volatile properties of the starting vehicles play an important role. The demand on vehicle solution properties run the gamut from low solids-high viscosity to high solids-low viscosity to meet the variable needs of economy, application, hiding, durability, etc. Methods have been determined in the laboratory to modify the solution properties of the Dow Resin 622 ester described, through the use of dibasic acids or prolonged heat bodying.

One of the most promising methods found for obtaining substantial increases in viscosity is through the use of small amounts of dibasic acids such as phthalic anhydride. In Figure 4 the rather dramatic effect of increasing amounts of phthalic anhydride on the viscosity of a soya acid ester of Dow Resin 622 is illustrated. The modification with 3.5% phthalic anhydride increased the viscosity from "B" to "Z4" at 60% N.V. in mineral spirits. The addition of phthalic anhydride resulted in a change in the weight relationship but the mole relationship remained at 1.0/0.7 polyalcohol to acid. In preparing these vehicles the phthalic anhydride is mixed with the other ingredients at the beginning of the cook and the esterification is carried out at 240°C. The amount of dibasic acid that can be used is rather limited due to the reactivity and molecular size of the fatty acid ester. For this same reason then it requires only small amounts to produce significant increases in viscosity. The type and concentration of fatty acids are factors in determining the exact

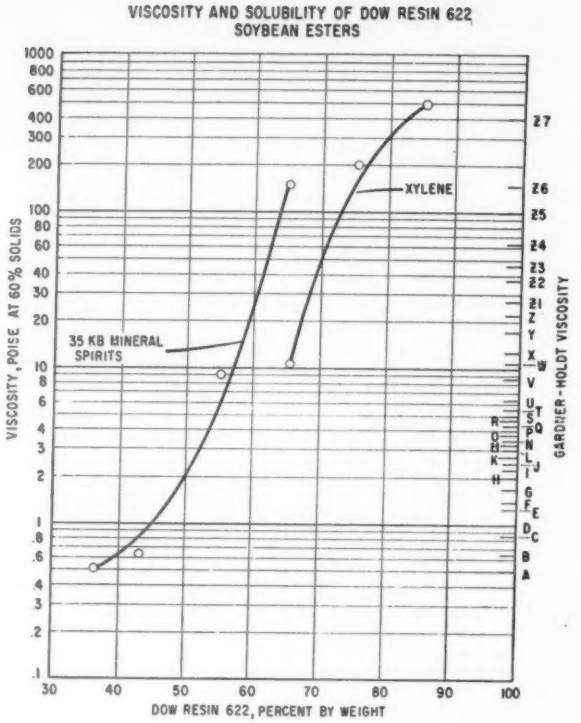

Figure 2

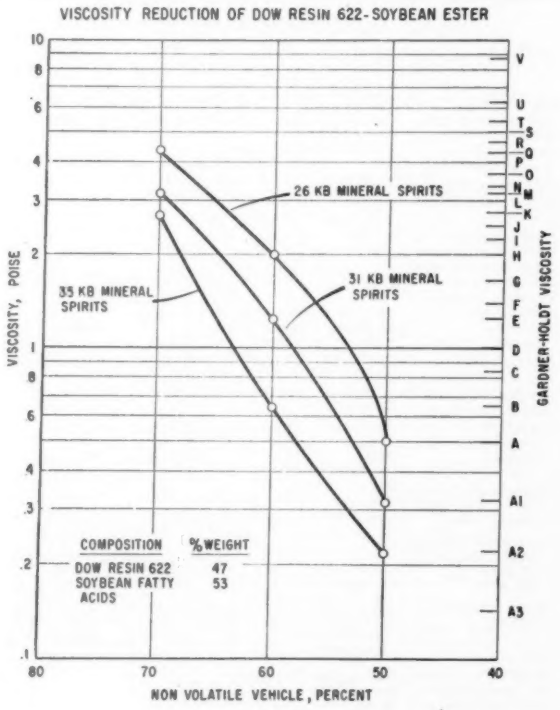

Figure 3

amount that can be tolerated in any specific formulation. Under the present methods used in the laboratory these esters are limited to less than 5% phthalic anhydride by weight of the total composition.

This marked influence of phthalic anhydride on viscosity is

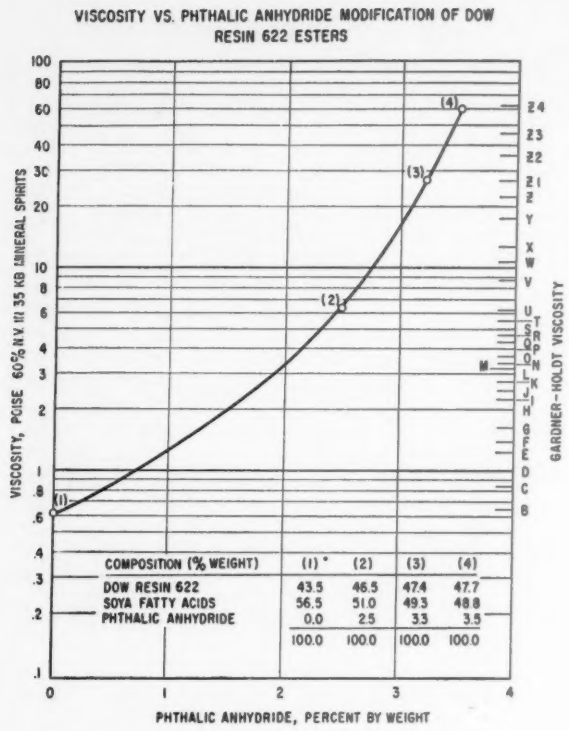

Figure 4

PHTHALIC - MODIFIED DOW RESIN 622 ESTERS

COMPOSITION	MCP-1		MLP-1		MSP-1		MTP-1	
	%WT.	COMB WT RATIO	%WT	COMB WT RATIO	%WT.	COMB WT RATIO	%WT.	COMB WT RATIO
DOW RESIN 622	46.3	1.0	47.4	1.0	47.4	1.0	46.3	1.0
DEHYDRATED CASTOR OIL FATTY ACID	51.4	0.6						
LINSEED FATTY ACID			49.3	0.56				
SOYBEAN FATTY ACID					49.3	0.56		
TALL OIL (25% ROSIN)							51.4	0.6
PHTHALIC ANHYDRIDE	2.3	0.1	3.3	0.14	3.3	0.14	2.3	0.1
VISCOSITY IN MINERAL SPIRITS (35 K.B.) 60% N.V.	Z		Z-1, Z-2		Z-3		Z-4, Z-5	
COLOR 60% IN MINERAL SPIRITS (35 K.B.)	4-5		5-6		4-5		5	
% VEHICLE SOLIDS AT G-H VISCOSITY	45		45		35		38	
DRY TOUCH*	1½ HOURS		1 HOUR		1¼ HOURS		2 HOURS	
DRY HARD	8 HOURS		5 HOURS		7 HOURS		9-10 HOURS	
FILM CLARITY	EXCELLENT		EXCELLENT		EXCELLENT		EXCELLENT	
FLEXIBILITY** (⅛ MANDREL)	NO CRACKS		NO CRACKS		NO CRACKS		NO CRACKS	
SWARD HARDNESS								
8 HOURS	9%		9.5%		9.3%		12.8%	
24 HOURS	12.5%		17.4%		14%		19.8%	
3 DAYS	16%		25%		20%		26%	
7 DAYS	19.8%		32%		27.7%		34%	
ABRASION RESISTANCE*** (WT LOSS PER 300 REVOLUTIONS)	.058		.033		.031		.040 (150 CYCLES)	
ALKALI RESISTANCE** (TIME TO FAILURE)								
1% NaOH	21 DAYS		12 DAYS		28 DAYS		7 DAYS	
5% NaOH	54 HOURS		32 HOURS		5 DAYS		24 HOURS	
WATER RESISTANCE** BOILING	20 HRS-CLEAR FILM, GOOD ADHESION (RUPTURED FILM)		16 HRS-CLEAR FILM (RUPTURED)		18 HRS-LOSS OF ADHESION (RUPTURES)		20 HRS-CLEAR GOOD ADHESION (RUPTURES)	

* 0.5% Pb + 0.05% Co (METAL/VEHICLE SOLIDS)
** FILMS BAKED ½ HOUR AT 250°F
*** FILMS AIR DRIED 3 WEEKS

Table IV

essentially due to its difunctionality and cross-linking ability. It is to be expected also that there would be some accompanying differences in other properties. Table IV shows some results of an evaluation of selected esters modified with phthalic anhydride. Generally speaking, the use of phthalic anhydride resulted in improvements in sward hardness, dry time, increased caustic and water resistance.

A logical sequence to the above work was the investigation of Dow Resin 622 in the preparation of alkyd compositions containing larger amounts of phthalic anhydride. On the basis of recent work in this field it was found that some of the glycerol phthalate (in a conventional alkyd resin) can be replaced by Dow Resin 622 to form an alkyd composition manifesting improved water and alkali resistance. However, due to its molecular size and polyfunctionality only 10-20% by weight of Dow Resin 622 of the total composition can be used.

Dimerized fatty acids behave similarly to phthalic anhydride in producing viscosity increases, although the increases are not as significant. The effect on film properties is also not as significant.

Another method of altering the viscosity of the fatty acid esters is by continued heat bodying at 240°C after the esterification is essentially complete, as determined by acid number. As illustrated in Figure 5 noticeable increases in solution viscosity occur as the cook is continued for 8 hours. The only important property improvement as a result of this prolonged cooking was in increased drying speed, from 7 hours to 3 hours dry hard time. The film of the prolonged cook showed an unexpected decrease in Sward hardness from 24 to 14% of the 24 hour stage. Other film properties appeared to remain the same.

Modified Dow Resin 622 Esters

Modification of these ester vehicles with such raw materials as rosin and vinyltoluene proceeds as easily as with other oil based vehicles. Of general interest, of course, are the variations in cost and solution and film properties.

Rosin modification of the straight fatty acid ester generally results in lower cost vehicles showing fast dry, improved overnight through-dry, excellent adhesion and an expected decrease in caustic resistance. The latter property was con-

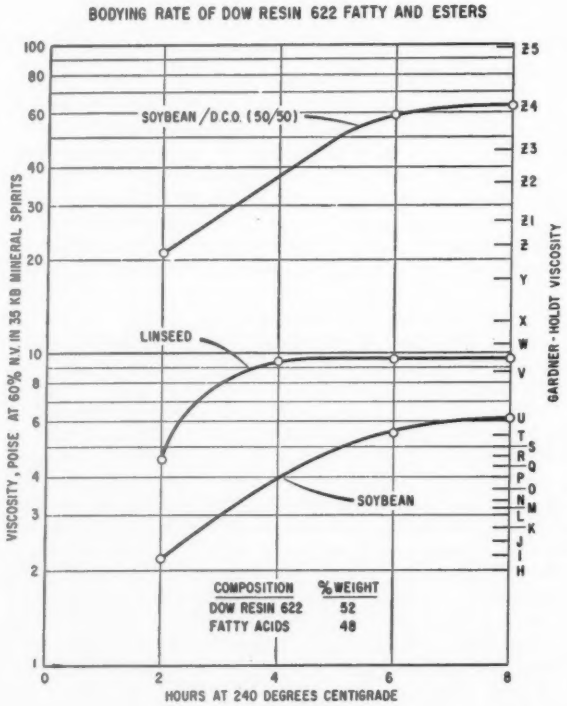

Figure 5

sidered good for a rosin modified vehicle, however. Table V contains some of the properties of a rosin modified linseed ester of Dow Resin 622. This ester was prepared by introducing the rosin with the fatty acid and resinous polyalcohol at the start and esterifying at 240°C for 3 hours. The final acid values of this type vehicle was much higher and color is poorer than straight fatty acid esters. Slightly longer esterification time (4-6 hours) or higher temperature (260-270°C) result in satisfactory acid values.

Rosin can also be incorporated by open kettle varnish procedure, using the oil in place of the fatty acid. Dow Resin 622, rosin and drying oil are charged to a varnish kettle and heated to 275°F. It is held at this temperature for a clear pill (3-4 hours). An alternate method which can be used is to esterify the polyalcohol with rosin in an alkyd type reactor to the clear pill stage and then solubilize the resultant hard resin in drying oil following standard varnish making techniques.

Vinyl Monomer Modification

During the past decade there has been considerable interest in vinyl monomer modification of oils and alkyds. Of special interest has been the use of styrene, and more recently, vinyltoluene. Properties such as excellent solution color and color retention, fast dry, good chemical resistance and durability are generally associated with styrene and vinyltoluene modified oils and alkyds.

Vinyltoluene was chosen for the modification of these esters because of its good solubility in aliphatic solvents and broad compatibility with oils. The technology involved in modifying these Dow Resin 622 esters is essentially the same as the modification of other oil based vehicles such as alkyds. The resultant products exhibit rapid air-dry, excellent hardness and flexibility and excellent chemical resistance. Table VI contains some of the properties of a 30% vinyltoluene modified soya ester. Probably the greatest contribution of vinyltoluene in this type of vehicle was in the marked improvement in tack-free and through-dry time, suggesting ultimate use in floor finishes, porch and deck enamels, automotive primers and fast air-dry and bake finishes.

The procedure for vinyltoluenation of these esters is first to prepare the ester in the normal manner and reduce to about 70% N.V. in mineral spirits. The ester is then heated to 165°C with agitation in a 3-neck flask equipped with reflux condenser and the vinyltoluene/catalyst mixture (3% di-tert-butyl peroxide catalyst based on monomer) is added slowly over a 1 hour period while maintaining the temperature at 165°C. One hour after the monomer is added the vehicle is thinned to 60% N.V. and the reaction continued for an additional 4 hours. The total polymerization time is 5 hours at 165°C.

The reaction described above generally proceeds quite smoothly. However, it is known that the acid number of the oil modified vehicle prior to vinyl monomer addition plays an important role in providing more compatible end products over a broader range of fatty acid types and monomer concentrations. Because of the rapid esterification rates of Dow Resin 622, it is rather difficult to obtain acid numbers much above those obtained by the normal procedure described previously. A method which is being considered in the laboratory for providing higher acid values involves holding out some of the fatty acid until later in the cook. An acid number range of 10-15 will greatly assist in minimizing gellation for this type of vehicle.

Bake Finishes

Of early interest in the development of Dow Resin 622 was the unusual chemical resistance exhibited by its fatty acid esters. The major part of the investigation of this property was performed on baked finishes. In this work it was found that the baking temperature and schedule have a significant effect on the alkali resistance. Table VII illustrates this

ROSIN MODIFIED DOW RESIN 622-LINSEED ESTER

COMPOSITION	MLR-1, % WEIGHT
DOW RESIN 622	37.5
LINSEED FATTY ACIDS	42.5
WW ROSIN	20.0
HOURS AT 240 °C.	3
FINAL ACID VALUE (VEHICLE SOLIDS)	20.5
VISCOSITY IN MINERAL SPIRITS (35 K.B.) 70% N.V.	X-Y
COLOR 70% IN MINERAL SPIRITS (35 K.B.)	10-11
% VEHICLE N.V. AT G-H VISCOSITY	56
DRY TOUCH *	2¼ HOURS
DRY HARD	6½ HOURS
FILM CLARITY	EXCELLENT
FLEXIBILITY ** (⅛" MANDREL)	NO CRACKS
SWARD HARDNESS	
8 HOURS	9.3%
24 HOURS	15.5%
3 DAYS	33.0%
7 DAYS	44.8%
ABRASION RESISTANCE (TABER) *** (WT. LOSS PER 300 REVOLUTIONS)	.043 GRAMS
ALKALI RESISTANCE **	
1% NaOH	12 DAYS
5% NaOH	24 HOURS
WATER RESISTANCE ** BOILING	13 HOURS, FILM RUPTURED GOOD ADHESION

* 0.5% Pb + 0.05% Co (METAL/VEHICLE SOLIDS)
** FILMS BAKED ½ HOUR AT 250°F.
*** FILMS AIR-DRIED 3 WEEKS

Table V

VINYLTOLUENE MODIFIED DOW RESIN 622-SOYA ESTER

SSV-1

COMPOSITION:
DOW RESIN 622 - SOYA ESTER 70%

	% WEIGHT
DOW RESIN 622	43 3
SOYA FATTY ACID	56 7

VINYLTOLUENE 30%

CATALYST — DI-TERT-BUTYL PEROXIDE, 3% BASED ON VINYLTOLUENE

VISCOSITY AT 60% N.V. IN MINERAL SPIRITS (35 K B)	V
COLOR AT 60% N.V. IN MINERAL SPIRITS (35 K B)	6-7
VEHICLE SOLIDS AT G-H VISCOSITY	52%
DRY TOUCH*	1 HR
DRY HARD	2½ HRS
FILM CLARITY	EXCELLENT
FLEXIBILITY** (⅛" MANDREL)	NO CRACKS
SWARD HARDNESS	
8 HOURS	11 5%
24 HOURS	16 5%
3 DAYS	21 0%
7 DAYS	25 0%
ABRASION RESISTANCE (TABER)*** (WT LOSS / 300 REVOLUTIONS)	063 GRAMS
ALKALI RESISTANCE**	
1% NaOH (RUPTURED FILM)	15 DAYS
5% NaOH	4 DAYS
WATER RESISTANCE** BOILING (RUPTURED)	8 HRS CLEAR FILM

* 0.5% Pb + 0.05% Co (METAL/VEHICLE SOLIDS)
** FILMS BAKED ½ HOUR AT 250°F
*** FILMS AIR DRIED 3 WEEKS

Table VI

point, using a 56.5% soya fatty acid ester as the example. Also of interest in this table is the excellent flexibility retained

(*Turn to page 82*)

STUDIES ON THE FLOCCULATION OF PHTHALOCYANINE BLUE

By

E. G. SHUR*

The primary objective of this work lay in the determination of the effect of variation in the composition of the organic dispersing medium upon the flocculation of copper phthalocyanine blue pigment.

Mixtures of dispersions of pigment in mineral oil and raw castor oil with various organic solvent media, as well as direct dispersions of pigment in solvents, were studied. Sedimentation volume, rheological and photomicrographic methods were employed.

Results indicated that the polarity of the dispersing phase is not the sole factor affecting the flocculation of copper phthalocyanine blue pigment. Solvent media alone, that is in the absence of surface active agents, are shown to have profound influence upon flocculative tendencies. Alkyl acetate esters were found to be superior to most other commonly used solvent media in their deflocculative effect on the phthalocyanine blue pigment tested.

Part I is concerned exclusively with the literature survey conducted with this study. The experimental phase (Part II) of this study will appear in the May issue.

THE behavior of the solid discontinuous phase of two phase, solid in continuous liquid media, is a constant source of practical difficulty in the paint and allied industries. The components which affect this property are the following:

1. The Binder and its
   a. Chemical composition,
   b. Molecular weight,
   c. Polarity,
   d. Nature of its solution or dispersion in organic solvents
   e. Wetting characteristics.
2. The Organic Solvent or Solvents
   a. Chemical composition,
   b. Molecular weight,
   c. Polarity and
   d. Wetting characteristics.
3. The Pigment Solid and its
   a. Chemical composition,
   b. Polarity,
   c. Particle size,
   d. Surface area,
   e. Solubility and
   f. Wetting characteristics
4. The Use of Detergent Wetting Agents

In the process of manufacturing pigmented materials, the dry pigments are wet with either: (1) the binder alone; (2) a mixture of binder and solvent; or (3) a mixture of binder, solvent and wetting agent. These are mixed and then ground in some milling operation. There are many mechanical devices and methods available, such as steel ball and pebble mills; 2 roller, 3 roller and 5 roller mills; the Keenok mill; Werner-Pfleiderer mixer; Banbury mixer, etc. whose principal objectives are: (1) a more or less intimate mixing and wetting of the solid by the liquid phase; (2) the breakdown of dry pigment agglomerates to their ultimate particle size; (3) their uniform dispersion in the binder; and (4) actual grinding and attrition of the original pigment particles.

Since present day dry pigments are normally supplied at the most advantageous particle sizes, only mixing, breakdown of agglomerates and dispersion need be accomplished. When dispersion is complete, the pigment particles are wetted with the vehicle. However, it frequently happens that dispersed pigment particles do not remain in the dispersed state, but come together or flocculate. Pigment flocculation causes loss of hiding, change of color, seediness, change in flow property, loss of gloss, etc. Flocculation is, therefore, of great economic importance in the manufacture of paints, enamels, lacquers, printing inks, textile finishes, etc.

Buckingham [14], in 1906 determined the rate of settling of quartz flour, titanium dioxide and other solids in water and organic liquids and arrived at no definite conclusions other than that viscosity played only a minor role in the rate of settling.

Green's article[30], in 1923, is a cornerstone in the study of flocculation. In it, certain basic properties of paint systems are set forth and the field is reviewed. Paint is described as partaking of some of the properties of a plastic material. Minimum shearing stresses and yield values are related to the existence of flocculation in a paint system. Flocculation involves the previous existence of a state in which the discontinuous solid phase was dispersed in the continuous liquid phase. During the process of flocculation, the discontinuous phase particles are brought in contact with each other and adhere, presumably because of forces of attraction in the surface. Intervening voids are filled with vehicle and

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a film of vehicle is assumed to exist between the points of contact. The force of attraction between the pigment particles may not be strong enough to bring them into direct contact with each other, but may orient them in a definite manner. The orientation sets up a structure in the liquid system which produces the condition known as thixotropy. A thixotropic structure is readily broken down by stirring, but will resume its structure again on standing.

A thixotropic paint does not flow until a given force is applied. The minimum force required to produce flow is known as the yield value. Wetting agents may induce deflocculation or dispersion and eliminate the structure, reducing the yield values to negligible quantities. The more extensive the pigment surface per unit area of shearing surface, that is the finer the pigment particle size, the greater the surface forces involved, the greater the force of flocculation and the more rigid the ensuing structure. This causes greater yield values. We may define viscosity as that force required to maintain a relatively uniform velocity in a fluid between two shearing surfaces. Any increase in the resistance of the system to flow requires a greater applied force to maintain the velocity. The processes of flocculation and orientation create a structure within the fluid which resists flow and hence decreases the mobility.

Green and Haslam[31], described a microplastometer for use in the study of plastic flow, liquid viscosity and yield values.

Green and Haslam[32], found that the yield value of pigment in linseed oil systems increases with greater interfacial area, with greater percent of pigment by weight or volume and with smaller particle diameter.

Freundlich[27], set up quantitative expressions: involving the surface energy either interfacial or free surface.

Bartell and Osterhoff[9], in 1927, determined that when a high interfacial tension exists between a pigment solid and a liquid phase, flocculation will follow with a decrease in the free surface energy of this system. Flocculation accompanies low values of adhesion tension, solid for liquid. Ultramarine Blue, for instance, having a lower adhesion tension for benzene as contrasted with that for water, will flocculate more readily in the former. In cases where flocculation results from the low adhesion tension between solid and liquid, the addition of a second liquid with high adhesion tension for the solid phase will decrease the free surface energy and stabilize the system. The adhesion tension is numerically equal to the work of substituting a solid-liquid for a solid-air interface. By means of a manometer, the pressure in grams per square centimeter required by one liquid to displace a second from a solid, may be determined. The voids or interstices between compressed solid particles behave as fine capillary pores whose radius may be determined from Poiseuille's formula for the rate of flow of viscous liquids through capillaries.

The adhesion tensions are numerical quantities, whereas, interfacial tensions have no absolute value. Other factors being equal, that suspension is most stable in which the liquid phase has the greatest adhesion tension for the solid phase. In this case, sedimentation may occur because of gravitational effects, but flocculation will be absent. If the adhesion tension of the solid for the liquid is low, and the cohesion of the solid particles for themselves is high, then flocculation will occur followed by settling and cake formation. In the event of the latter, the liquid is driven out of the capillary pores. In certain instances where the adhesion tension of the solid for the organic liquid is low, the pigment particles may go to the liquid-air interface causing loss of surface gloss.

Lipsett, Johnson and Haase[39], determined approximate values for the surface energy of solid NaCl by measurement of the difference between the heat of solution of ordinary crystalline salt and that of finely divided salt at the same concentration. The energy associated with the creation of the finely divided surface should appear as a smaller heat of solution, and was found to be 12.3 cal./mol. less, from which the surface energy was calculated to be about 400 ergs./cm^2.

Bartell and Miller[8], measured the adhesion tension between crude oils and silica and the interfacial tension of organic liquids against water.

Baldwin[4], determined the oil absorption of pigment mixtures and found them to be additive quantities. Oil absorption was found to bear an inverse relation to the adhesion tension of Bartell and Osterhof. Liquids which wet pigment will have lower oil absorption values than those which do not.

Bartell and Greager[5], found a simple linear relationship to exist between adhesion tension and liquid absorption for liquids forming a zero angle of contact with a solid. They hypothesized that the solid attracts the liquid and that this influence extends beyond a monomolecular layer. The liquid between two particles is attracted by both. This tends to draw the particles together. The stronger the attraction, that is the higher the adhesion tension, the greater this tendency, hence the greater the adhesion tension the less the volume of liquid required to wet the solid. Where there is a high degree of wetting, the air is displaced completely. As the adhesion tension increases, the solid particles are drawn still closer together. The highest oil absorption would then be exhibited by a liquid of zero contact angle and of low adhesion tension against the solid.

Antonoff[3], attempted to measure the surface tension of solids. Pastes of lamp black and oil of varying composition were prepared and their surface tension determined by measuring the breaking stress of a thin film. Pastes were forced through tubes made of the solid. The surface tension of that paste which just ceased to wet the solid was taken as the surface tension of the solid. This determination has no theoretical foundation.

Ostwald and Haller[45], determined the sedimentation volumes of inorganic powders in various organic liquids and found the largest volumes in the non-polar liquids of lowest dielectric constant. Drying of the powders produced smaller volumes. Centrifugation of sediments gave results of corresponding, although smaller values.

DeWaele and Lewis[19], engaged in plastometeric studies of pigments in miscellaneous media. Dispersed particles are described as surrounded by a pseudo-solid bound layer of vehicle which greatly affects plastic flow. Plasticity is apparently proportional to the thickness of the hypothetical adsorbed layer.

DeWaele[18], found that poor wetting sometimes accompanies flocculation. Flocculation is described as a factor which is dependent upon the lack of high cohesive strength in the vehicle as well as upon the development of a semi-rigid network of floccules. If the layers of liquid around the particles are sufficiently thick, flocculation may be prevented.

McMillen[43], associated flocculation with good *wetting* (sic). It results when each solid particle is surrounded by a shell of liquid greater than the monomolecular, the orienting forces extending into the liquid so that viscosity is increased. The actual process of flocculation is pictured as resulting from the sharing of the adsorbed liquid layers by two or more particles. This causes high oil absorption, a yield value and low mobility. Good wetting, high adhesion and a small angel of contact, cause flocculation, high yield value and low mobility. Settling occurs in the poorest wetters. Poor wettability is not considered to be the cause of plasticity in solid-liquid systems.

Harkins and Dahlstrom[34], established the energy relations between solid oxides such as those of titanium and zinc, and organic liquids. These were found similar to those existing between water and the same organic liquids. The energy of immersion increases with the polarity of the liquid. The presence of small quantities of a highly polar liquid such

as water increases values tremendously. If a powdered solid is immersed in a polar-non polar liquid, the liquid molecules are presumed to orient themselves at the interface, the polar groups toward the polar oxide powder particles. If a polar or polar-non-polar organic liquid is present in small quantities in a non-polar organic liquid, these molecules are preferentially adsorbed, the polar group oriented toward the polar oxide and surrounding the particle with a monomolecular layer. This is a rational attempt to explain why values for the energy of immersion in those instances approach those of immersion in the impurity alone.

Bartell and Hershberger[6], maintained that the decrease in free surface energy which occurs when an organic liquid comes in contact with a polar solid is similar to that which takes place when the same organic liquid comes in contact with water. The term "liquid absorption" refers to the minimum amount of liquid which is required to wet 100 g. of powder. This property of a series of liquids exhibiting zero contact angles with polar solids, increases linearly as the interfacial tension values of these liquids increases. With a non-polar solid, such as carbon, the liquid absorption values decrease linearly. The order of decrease in free energy taking place when a polar solid is wetting with a series of zero contact angle liquids, is the same as that which occurs when water replaces the polar solid. Where liquids of finite contact angle with the solid are used, the values for liquid absorption shown no relationship to the values for interfacial tension and are much lower than those values which are obtained using zero contact angle liquids of analogous interfacial tension. Liquid absorption values vary directly with the specific surface area of a solid.

Davidson[16], found frictional forces between pigment particles to be a contributing factor in flocculation even when the particles are wet. Deflocculation may be accomplished by adding another liquid of what was termed better "lubricating" properties. Good wetting liquids may therefore be poor dispersing ones (McMillan v.s.).

Rhodes and Jebens[47], found that water increases yield values and decreases the mobility of linseed oil paint, where zinc oxide was used as the pigment. Free fatty acids had a similar effect.

Williamson and Heckert[56], studied the rheological properties of starch dispersions. Good wetting was accompanied by slow settling and small sedimentation volumes. The difference in the volume of sediment as determined both by gravitational sedimentation and by centrifugation, increased with increased flocculation.

McMillen[44], defined thixotropy as a condition existing in a plastic system which is rendered fluid by mechanical shear and which gains its plasticity after removal of the mechanical action. The Kampf Viscometer was used for measuring consistency at shearing stresses less than 1 dync./cm^2 and at rates of shear as low as 10^{-6} reciprocal seconds.

Ryan, Harkins and Gans[48], in 1932, found that the effect of a small addition of a polar-non-polar liquid such as oleic acid to a suspension of pigment in a non-polar solvent as benzene, changes flocculation to deflocculation and decreases the sedimentation volume. The further addition of the highly polar liquid water, however, produces an even higher energy of flocculation and a larger sedimentation volume. This is explained by the disturbance caused as a result of the introduction of water to the monomolecular oriented film of oleic acid at equilibrium on the solid. The extent of settling and flocculation, therefore, depends upon the nature of what is adsorbed on the pigment-liquid interface as well as upon the type adsorbed material. The effect of metallic soaps is similar to that of oleic acid. The pigment in this investigation, titanium dioxide, exhibits a high energy of immersion in both oleic acid and water corresponding to a high degree of wetting of the pigment by these liquids. Obviously flocculation and sedimentation are not simple functions of wettability. Meticulous efforts were made to secure completely anhydrous pigments and liquids as the effect of traces of water was great. Results indicated, however, that correct relative values may be obtained even in the presence of water. When the polar pigments in this work were suspended in organic liquids of varying degree of polarity, the sedimentation volumes were found to vary inversely with the degree of polarity. The addition of water had the least effect on suspensions in liquids of high polarity and more water was required to effect flocculation where the continuous phase consisted of organic liquids of greater polarity.

Harkins and Gans[35], found the heat of immersion of a polar pigment in liquids of varying polarity to increase with their polarity. This heat is considered a measure of wetting. The heat developed by immersion in liquids of intermediate polarity was of intermediate magnitude. When a small amount of polar liquid is added to a system consisting of a pigment in a non-polar liquid the evolved heat is increased almost to that developed when the pigment is immersed in the pure polar liquid. The amount of polar liquid required is that necessary to form a monomolecular film about the pigment particles. Good wetting is accompanied by dispersion and hard settling and poor wetting by flocculation and suspension. It would appear that flocculation is accomplished at the effect of a reduction in free energy.

Forbes[26], reviewed several theories of flocculation, the most interesting of which is the electrical one, based on the Helmholtz double electric layer concept that a particle immersed in a liquid is electrically charged and attracts a layer of opposite charge from the liquid. Flocculation results because of the attraction between the two particles so that by uniting to form one continuous double layer, an economy of area is accomplished. The cohesion theory describes this phenomenon as occurring when a pigment is poorly wet by a liquid; the force of cohesion within the liquid causes it to draw away from the pigment and permits them to flocculate.

Bartell and Jennings[7], developed a modification of the method of displacement pressures for determining adhesion tension. The adhesion tension of different hydrophilic solids against a series of liquids proved the values to be of the same order of magnitude. This result is due to the presence of adsorbed water which imparts similar values of free surfaces energy.

Bartell and Walton[10], altered the surface properties of powdered stibnite by heat treatment which resulted in powders ranging from hydrophobic to hydrophilic without change in the appea ance, size or pore radius. The degree of packing upon settling is greatest in liquids against which the greatest adhesion tension is shown.

Freundlich[28], discovered that thixotropic substances, i.e., substances which exhibit isothermal sol-gel transformations, form large sedimentation volumes. This may be extended to say that thixotropy is characteristic of systems in a condition between flocculation and peptization, between large and small sedimentation volumes. Thixotropy results from an affinity between the particles and the liquid which forms bound layers about them thus preventing them from packing closely.

Thomas and Soday[50], found the variation of flocculation with polarity described above to hold true. A double bond was considered as exhibiting polar properties to a degree. In a series of tests, however, the sedimentation volume was found to increase with higher iodine number, i.e., with greater polarity according to this concept.

Blom[12], found that the sedimentation volume varied approximately with the heat of vaporization of the organic liquid. The higher the heat of wetting the lower the sedimentation volume.

Reising[46], suspended paint pigments in different media and observed their response to an electrostatic field with a

microscope. The electrostatic charges exhibited varied with the medium. When suspended in polar-non-polar media, either a positive or a negative charge was assumed, whereas, in non-polar phase, both positive and negative charges were demonstrated. The mixing of pigments results in charges different from those of the individuals in polar-non-polar dispersions. When these pigments are either positively or negatively charged in polar-non-polar media, dilution with mineral spirits—non-polar—causes dispersion. Pigments which are both positively and negatively charged in non-polar media flocculate upon the addition of mineral spirits. In the former case, flooding will occur if the pigments are of different particle size; it will not occur in the latter case regardless of particle size differences. Flooding does not occur when pigments are flocculated. It is evidenced by the disturbance of the moist film, creating a new surface which is of different shade from that of the undisturbed surface. Reising observed changes in charge of percent of charge with time.

Khomikovskii[36, 37], found that stability of suspensions of various pigments in toluene and paraffin oil was effected by 0.5 to 1% concentration of oleic acid, but that above this concentration flocculation occurs.

Tartakovskaya[49], suspended zinc oxide in paraffin oil and oleic acid with the formation of the oleate soap. Increase in the percent of oleic acid produces less wetting, flocculation and the formation of spatial structures which decrease mobility.

Donald[20], found the relation between sedimentation and flocculation to be a close one. He defines the sedimentation volume as the volume of a settled solid when its rate of settling drops suddenly from a comparatively fast to a relatively slow value. Substances which can be flocculated can usually be floated.

Allen and Lanson[2], experimented with wetting agents and explain the difficulties of applying any theoretical principles to the complex systems actually in use in the paint and allied fields.

Gallay and Puddington[29], measured the sedimentation volumes of starch, iron and magnesium oxides and talc. Moisture effects were especially noticeable in non-polar liquids. Settling was found to be a function of flocculation.

Fischer and Jerome[25], studied the effect of surface active agents on pigment dispersion and found plastic viscosity and yield value to be excellent measures of the degree of flocculation.

Mardles[41], attributed the anomalous viscosity and thixotropy of solid suspensions in liquids to flocculation. Solutions of high molecular weight compounds with minimum viscosity represent a close approach to solutions of simple molecules and display a minimum of flocculation.

Akamatsu[1], believed hydrophilic powders unlikely to flocculate in polar liquids, producing small sedimentation volumes. Such particles in non-polar liquids flocculate and form large sedimentation volumes.

Daniel and Goldman[15], classified dispersions as "good" or "bad" by determining the amount of liquid required to cause 10 grams of solid to form a coherent mass. This is called the "wet" point. The "flow" point is that amount of liquid required to form a flowing mass. Good dispersion is characterized by a free flowing mass; poor dispersion, by a plastic mass displaying no flow.

Fischer, Harvey and Dyer[24], investigated the variation of the yield value of titanium dioxide-non-polar oil suspensions upon the addition of polar liquids. An unmistakable upward trend of yield value was found with increasing interfacial tension between polar liquid and oil. Surface active agents promoted deflocculation by lowering the liquid-liquid interfacial tension.

Fischer and Gans[23], presented a summary of the field of pigment dispersion. The bulk of the dispersion of solids in liquids is produced by the application of mechanical force to viscous suspensions of solids in liquids. This effects a diminution in aggregate size and the displacement of adsorbed air, moisture or other substances by the liquid. When hydrophilic pigments are dispersed in liquids exhibiting high interfacial tension against water, the sedimentation volume is high and the volume is found to be low in the reverse instance. For hydrophobic solids, high sedimentation volumes are associated with low interfacial tension against water. There appears to be a trend towards low sedimentation volumes in liquids of high dielectric constant. These conditions may be summarized in Table I.

	Deflocculated	**Flocculated**
Visual Appearance	Fluid	Paste
Rheology	Low Yield Value	High Yield Value
Sedimentation Volume	Low; Equilibrium Slowly attained	High; Equilibrium Rapidly Attained
Heat of Immersion	High	Low
Work of Adhesion	High	Low

Table I

Bibliography

1. Akamatsu, H., Bull. Chem. Soc. Japan, *17*, 333 (1942).
2. Allen, R. A. and Lanson, H. J., Paint, Oil and Chem. Rev., *102*, 10 (1940).
3. Antonoff, G. N., Phil. Mag. Ser. 7, *1*, 1258 (1926); *4*, 792 (1927).
4. Baldwin, J. T., Ind. Eng. Chem., *21*, 326 (1929).
5. Bartell, F. E. and Creager, O. H., Ind. Eng. Chem., *21*, 1248 (1929).
6. Bartell, F. E. and Hershberger, A., Ind. Eng. Chem., *22*, 1304 (1930).
7. Bartell, F. E. and Jennings, H. Y., J. Phys. Chem., *38*, 495 (1934).
8. Bartell, F. E. and Miller, F. L., Ind. Eng. Chem., *20*, 738 (1928).
9. Bartell, F. E. and Osterhof, H. J., Ind. Eng. Chem., *19*, 1277 (1927).
10. Bartell, F. E. and Walton, C. W., Jr., J. Phys. Chem., *38*, 503 (1934).
11. Beard, E. E., U. S. P. 2,476,950 (1949).
12. Blom, A. V., Farben Z., *41*, 233 (1936).
13. Botti, E. C., Off. Dig. Fed. Paint & Var. Prod. Clubs, 408 (June 1950).
14. Buckingham, E., Trans. Amer. Electrochem. Soc., *9*, 265 (1906).
15. Daniel, F. K. and Coldman, P., Ind. Eng. Chem., Anal. Ed , *18*, 26 (1946).
16. Davidson, D., Paint, Oil and Chem. Rev., *89*, 12 (1930).
17. DeBryne, N. A., Aircraft Engineer, *28*, 51 (1939).
18. DeWaele, A., Farben Z., *35*, 2472 (1930).
19. DeWaele, A. and Lewis, G. L., Kolloid Z., *48*, 126 (1929).
20. Donald, M. B., Chem. Ind., *59*, 105 (1940).
21. FIAT Final Report No. 1313, PB 85172, *III*, 345 (1948).
22. Fischer, E. K., "Colloidal Dispersions", 109, John Wiley & Sons, Inc., New York (1950).
23. Fischer, E. K. and Gans, D. M., "Colloid Chemistry", Alexander, J., *6*, 286, Reinhold Publishing Corp., New York (1946).
24. Fischer, E. K., Harvey, E. N. Jr., and Dyer, A. S., J. A. C. S., *68*, 522 (1946).
25. Fischer, E. R. and Jerome, C. W. Ind. Eng. Chem., *35*, 336 (1943).
26. Forbes, D. H. S., J. Oil, Colour Chem. Assoc., *15*, 151 (1932).
27. Freundlich, H., "Colloid and Capillary Chemistry", 157, Metheum and Co., Ltd., London (1926).
28. Freundlich, H., "Thixotropie", Hermann & Cie, Paris, (1935).
29. Gallay, W. and Puddington, I. E., Can. J. Research, *21B*, 171 (1943).
30. Green, H., Ind. Eng. Chem., *15*, 122 (1923).
31. Green, H. and Haslam, G. S., Ind. Eng. Chem., *17*, 726 (1925).
32. Green, H. and Haslam, G. S., Ind. Eng. Chem., *19*, 53 (1927).
33. Hancock, A. and Brown, T. F., J. Oil & Colour Chemists Assoc., *30*, 317 (1947).
34. Harkins, W. D. and Dahstrom, R., Ind. Eng. Chem., *22*, 897 (1930).
35. Harkins, W. D. and Gans, D. M., J. Phys. Chem., *36*, 86 (1932).
36. Khomikovskii, P. M. and Rebinder, P. A., Acta Physiochim., (U.S.S.R.), *8*, 290 (1938).
37. Khomikovskii, P. M., Rusetskaya, T. V. and Morosova, M. A., Colloid J. (U.S.S.R.), *4*, 139 (1938).
38. Lecher, H. Z., Brouillard, R. E. and Grambalvo, V. A., U.S.P. 2,524,672 (1950).
39. Lipsett, S. C., Johnson, F. M. G. and Maass, O., J. A. C. S., *49*, 925 (1927).
40. Loukomsky, S. A., U.S.P. 2,486,304 (1949).
41. Mardles, E., Nature, *153*, 746 (1944).
42. McDowell, C. W. and Usher, F. L., Proc. Roy. Soc., London, *A131*, 409 (1931).
43. McMillen, E. L., Ind. Eng. Chem., *21*, 1237 (1929); ibid., *22*, 890 (1930).
44. McMillen, E. L., ibid., *23*, 676 (1931).
45. Ostwald, W. and Haller, W., Kolloidchem. Beihelft, *29*, 354 (1929).
46. Reising, J. A., Ind. Eng. Chem., *29* 565 (1937).
47. Rhodes, E. H. and Jebens, W. J., J. Phys. Chem., *35*, 383 (1931).
48. Ryan, L. W., Harkins, W. D. and Gans, D. M., Ind. Eng. Chem., *24*, 1288 (1932).
49. Tartakovskaya, V. E. and Khazine, Y. G., J. Applied Chem., (U.S.S.R.), *12*, 1710 (1939).
50. Thomas, C. A. and Soday, F. J., Ind. Eng. Chem., *28*, 1174 (1936).
51. Vander Waarden, M., J. Colloid Sci., *5*, 324 (1950).
52. Vesce, V. C., "A Study of the Properties of Phthalocyanine Pigments", Harmon Color Works, Inc., Haledon, New Jersey (1944).
53. Voet, A., J. Phys. & Colloid Chem., *51*, 1037 (1947).
54. Von Thinius, K., Kundstoffe, *37*, 36 (1947).
55. Werthan, S., Wien, R. M. and Fatzinger, E. A., Ind. Eng. Chem., *25*, 1288 (1933).
56. Williamson, R. V. and Heckert, W. W., Ind. Eng. Chem., *23*, 667 (1931).
57. Wiswall, F. A., U.S.P. 2,486,351 (1949).

DRYING OIL TECHNOLOGY

PART IV

Chemical Processing

AT VARIOUS times, paint technologists have been accused of allowing themselves to be guided more by rule-of-thumb tests than by fundamental data. This goes back to the old days when oils were used without modification. Then a perfectly sound test for oil adequacy was to add driers, brush out the oil, and compare the drying speed and film hardness against an acceptable standard. In this way, enough useful facts were made available.

But today this is not the whole story. An oil which produces a desirable fast drying paint may also contribute excessive yellowing, poor flexibility, or early breakdown. Furthermore these properties may or may not be carried over to intermediates. Conversely, the so-called poor drying or non-drying oils may become extremely valuable when used as chemical intermediates. There we find fundamental oil properties such as functionality, saturation, fatty acid distribution, and spatial configuration becoming quite important. The fact is that a great deal of fundamental science does enter into a modern surface coating.

We have discussed in previous sections how oils are improved in the refinery and how oils are upgraded by the various fractionation processes. We will now show that the greatest improvements are brought about by the use of glycerides as chemical intermediates. These chemical intermediates supply us with coating materials having no counterpart in nature. The survival and the future direction of the drying oil industry lies in our chemical ability to exploit oils as chemical intermediates.

The following reactions are the basic transformations which can give rise to coating oleochemicals. Each of these will be very briefly reviewed.

1. esterification of fatty acids with higher alcohols
2. varnish "cooking"
3. polyesterification
4. removal of hydroxy and keto groups
5. isomerization
6. dimerization and polymerization
7. halogenation and dehalogenation
8. oxidative degradations
9. epoxidation
10. maleinization and Diels-Alder condensations
11. copolymerization.

Esterification

Improved drying oils are obtained by reesterifying crude or segregated fatty acids with higher polyhydric alcohols such as pentaerythritol, sorbitol, methyl glucoside, polyallyl alcohol, etc. The chemistry of this reaction is quite simple (See Figure 1).

Unfortunately, increasing the functionality of oils with higher alcohols is quite expensive since the fatty acids first must be isolated from the naturally occurring glycerides and then reesterified with the desired polyol.

In spite of this, many industrial applications have been found for them. With pentaerythritol for example, soya bean fatty acids approximate the drying characteristics of natural linseed oil without sacrifice of the desirable non-yellowing properties. Similarly, linseed fatty acids can be upgraded to approximate tung oil.

In general, the rate of drying of reesterified fatty acids is similar to the original glyceride, but the hardness of the film is related to the number of primary hydroxyl groups in the higher polyol. In other

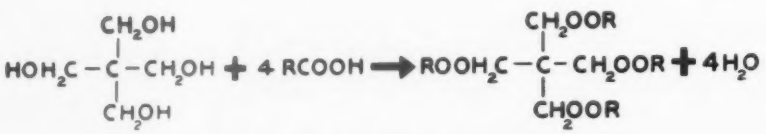

Figure 1. Typical esterfication reaction

This series of articles is being prepared by the Editorial Staff of Paint and Varnish Production.

properties such as reactivity and pigment wetting, they are similar to the original drying oil.

By fractionating the fatty acids, and then segregating the more unsaturated fatty acids, extremely reactive reesterified oils can be produced. Reconstructed marine oils are commercially available.

Varnishes

Because all natural oils are relatively slow drying and produce soft films, they are modified with various hard resins. Hard resin modified oils are normally called varnishes. By resins we will mean natural or synthetic organic compounds which are soluble in organic solvents and melt when heated. Varnish resins are usually hard, brittle solids which may be dispersed or dissolved into oils to produce oleoresinous varnishes. These resins may be thermoplastic or thermosetting in character.

The resins include the various natural gums such as congo, congo esters, kauri, and batu; rosin and rosin esters, maleics; pure and modified phenolics; terpenes; coumarone-indene and petroleum resins. The final properties desired in the varnish will determine their usage.

Oleoresinous varnishes are referred to as short, medium, or long oil, depending on the number or gallons of oil used with 100 pounds of resin. A short oil may contain 6 - 18 gallons oil, a medium oil varnish may contain 18 - 30 gallons oil, and a long oil varnish may contain 30 - 60 gallons oil. Naturally, the properties of the varnish film depend on both the resin and oil, their ratios, and the method of combination.

Table I

Oil Length	Type
6-10 gallon	rubbing varnish
10-15 gallon	industrial baking and interior finishes
15-20 gallon	floor varnishes
20-30 gallon	interior enamels
25-40 gallon	spar varnishes
30-60 gallon	exterior enamels
60-100 gallon	floor coverings, printing inks.

Typical oil lengths and uses

The main reasons for blending hard resins with oils are to increase film hardness, speed of dry, enhancement of gloss, and the improvement of the various resistance properties. Naturally, as the oil length increases, the varnish becomes softer and more flexible. Each type has specialized end uses (See Table I).

All the conventional drying oils are suitable for use in varnish cooking. Some oils such as tung, perilla, oiticica, and dehydrated castor oils contain conjugated double bonds and therefore will polymerize faster than oils containing isolated double bonds. These four will gel quickly on heating. In varnish "cooking", this leads to short processing periods. Other oils, such as linseed, soya bean, or safflower, are slower and are known as the soft oils. The soft oils can be used competitively with the hard oils in varnishes if they are prebodied, processed longer, modified, or used in conjunction with harder, more reactive varnish resins.

Varnishes are made by cooking oils and resins in movable or standing kettles, thinning with a suitable solvent, such as mineral spirits, filtering, and packaging. Temperatures ranging from 560° to 600°F. are usual. The variations are of course infinite.

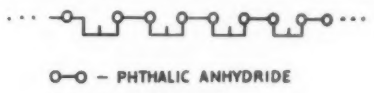

Figure 2. Chemical linkage of phthalic anhydride and glycerol showing a polyol phthalate with excess hydroxyl groups

Alkyds & Polyesterification

In the broadest sense an alkyd is the polyester of a poly-basic acid with a polyhydric alcohol. More specifically, we mean an oil modified glyceryl phthalate. Another way of looking at alkyds is to consider them as the fatty acid esters of long chained poly-functional alcohols. The alcohol is a resinous glyceryl phthalate (or other polyol phthalate) containing excess hydroxyl groups (See Figure 2).

Alkyds are frequently described as short, medium, or long oil as a carry over from varnishes. This terminology is a throwback to the varnish era when the glyceryl phthalate was considered as the hard resin component of the alkyd varnish.

Solubility characteristics vary with the extent of oil modification; the short oil types (25-40% oil) require aromatic or even stronger solvents; the medium to long oil types (45-65% and 65-80% oil) are soluble in aliphatic hydrocarbons.

Flexibility of alkyd films increase proportionately with increasing oil length. Alone, a phthalic glyceride resin is hard, brittle, permanently tacky and soluble in esters. As the oil modification increases, the properties approach that of the pure oil. Specific properties are dependent upon the amount and kind of oil modification. Thus, the palest alkyds are made from non-drying oils, the fast drying alkyds are made from oils like linseed and tung, the easiest brushing alkyds are long oil modifications, and so on.

Alkyds, whether short or long, are relatively low molecular weight intermediates. Only on oxidation does cross linking occur; only then do alkyd films attain the hardness

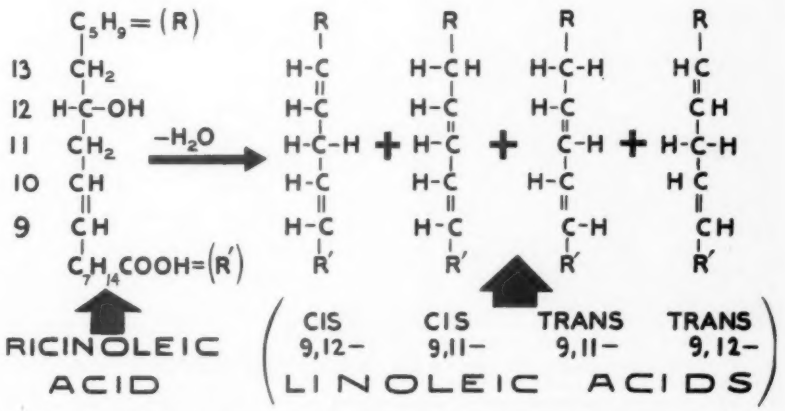

Figure 3. Reaction showing the dehydration of castor oil

and resistances expected of high molecular weight films.

Removal of Hydroxy & Keto Groups

Castor oil is a non-drying oil which, aside from use as a plasticizer, is of little value in air drying compositions. Castor oil is unique in that it is the only alcohol soluble oil commonly available. This is because the oil is mainly the glyceride of ricinoleic acid, 12-hydroxy-9-octadecenoic acid. This oil can be dehydrated to yield an excellent drying oil.

Castor oil can be dehydrated directly or catalytically to yield a mixture of conjugated and non-conjugated linoleates. Dehydrated castor oil is less active than tung oil. Two factors are responsible for this reduced activity. The first is that only half of newly created linoleates are conjugated. Secondly, the dehydration results in a mixture of cis and trans forms. Since the trans form is normally less reactive than the cis form, the overall activity is less. (See Fig. 3)

For many years attempts have been made to convert non-drying oleates into dihydroxy stearates and then dehydrate them to linoleates. However, the dehydration does not take place as one might hope for and successful drying oils have not been obtained by this method.

Oiticica oil contains considerable amounts of licanic acid, 4-keto-9, 11, 13-octadecatrienoic acid. Attempts to remove the keto group by splitting with such agents as semicarbazide have not produced satisfactory drying oils.

Figure 4. Conversion of unsaturated non-conjugated oils into conjugated varieties is shown the above reaction.

Isomerization

Unsaturated non-conjugated oils can be converted into conjugated varieties by one of several ways. Double bonds in an oil can be shifted by treatment with alkaline solutions at elevated temperatures and pressures. Sodium, potassium, and lithium hydroxides have been used for this purpose. The shift that occurs may be depicted in Figure 4. The conjugated positions are different from those found in natural oils and may be located in the 10, 12 and 10, 12, and 14 positions.

Other catalysts, such as iodine, silica gel, nickel deposited on activated carbon, and many other, will isomerize double bonds at temperatures ranging from 150- 200°C. High Temperatures (350° C.) at low pressures (below 1 mm.) can also induce isomerization. Blowing at high temperatures is accompanied by shifts from non-conjugated to conjugated forms.

Due to an accompanying cis-trans isomerization, after-tack is also common to isomerized oils. For example, alkyds made from

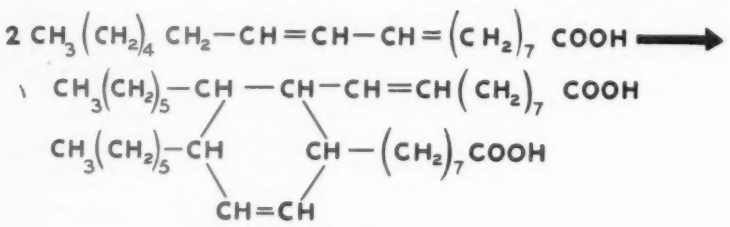

Figure 5. Dimerization reaction

Table II

ORIGIN AND CHARACTERISTICS OF NATURAL RESINS

Resin	Origin	Melting Range, °F	Acid Value	Solubility Alc*	Solubility Hy*	Use
Congo	Belgian Congo	210-350	100-120	In*	In	Cook in varnish
Congo ester[1]	Esterified Congo	240-280	5-10	In	S*	Cook in varnish
Kauri	New Zealand	220-280	60-80	In	In	Cook in varnish
Pontianak	Borneo	200-275	120-140	S	In	Cook in varnish
Manila	East Indies	190-250	110-140	S	In	Cook and cold-cut[2]
Boea	East Indies	175-250	120-150	S	In	Cook and cold-cut
Batu	East Indies	250-290	20-40	In	S	Cook and cold-cut
East India	East Indies	200-280	20-40	In	S	Cook and cold-cut
Dammar	Batavia	160-240	25-35	In	S	Cold-cut[2]
Dammar	Singapore	160-240	25-40	In	S	Cold-cut
Accroides	Australia / Africa	170-250	120-130	S	In	Cold-cut
Sandarac	Australia	200-260	120-150	S	In	Cold-cut
Mastic	Island of Chios	130-160	50-70	S	S	Cold-cut
Elemi	Philippines	Balsam	20-35	In	S	Cold-cut

*Alc=alcohol; Hy=hydrocarbons; In=insoluble; S=soluble
[1]Included for comparison only
[2]Cold cut: dissolved in solvent, either cold or by mild heating.

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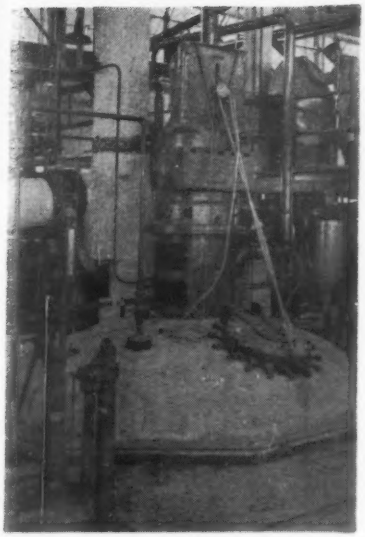


Large set kettles for manufacturing alkyd resins

isomerized oils bake or polymerize more rapidly but air dry more slowly than the parent oil. They possess poorer water resistance but improved alkali resistance.

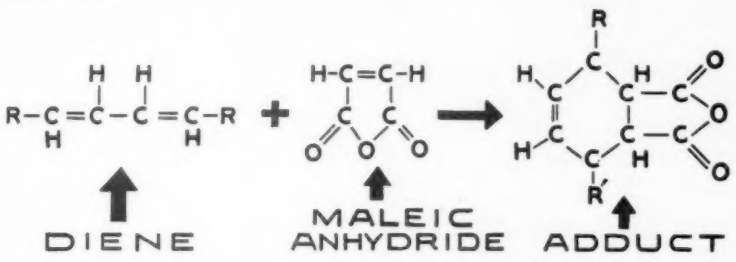
Dimerization & Polymerization

Polyunsaturated fatty acids can be heated under pressure in the presence of water to produce a product known as dimer acids. This is apparently the Diels-Alder condensation product of the isomerized linoleic acids. Because linoleic acid is common to such relatively non-drying oils as corn, soya, and cotton seed, fatty acids of these oils can be dimerized and the monomeric acids distilled off (See Figure 5).

This reaction may be continued further to form trimers and even tetramers. The dimer acids may be esterified with polyols, modified into alkyds or blended into varnishes. Compared to linseed oil, synthetic dimer oils are faster in dry, and superior in water and alkali resistance.

Halogenation & Dehalogenation

Every once in a while the claim is made that treatment of unsaturated fatty acids or oils with halogens or their oxy-acids followed by dehydrohalogenation will yield oils of enhanced unsaturation. This reaction is related to hydroxylation and dehydration. Its utility can be measured by the fact that commercial products obtained by this method are unknown.



Diels-Alder reaction with conjugated oil

Oxidative Degradations

The reaction between ethylene bonds and active oxygen, such as ozone, peracids, peroxides, etc., results in a cleavage of the carbon bonds (Figure 6).

Valuable dibasic acids and short straight chain monoacids are thus made available by the degradation of oils or fatty acids.

For example, in the presence of alkali, sebacic acid is produced by the oxidation of castor oil at high temperatures. The direct oxidation of castor oil produces undecylenic acid. Pelargonic acid and azelaic acid are products derived from the oxidation of oleic acid.

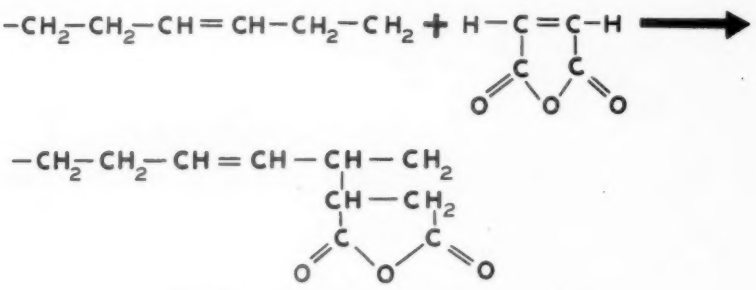
Epoxidation

Unsaturated oils of indifferent drying properties can be upgraded into useful plasticizers by an oxidative process known as epoxidation. Per-acids such as perbenzoic acid, performic acid, or peracetic acid, transform olefins quantitatively into the corresponding oxirane (epoxy) compound. This reaction is quantitative only for isolated double bonds.

Diels-Alder Condensations

Drying oils can be upgraded by

(*Turn to page 60*)



Diels-Alder reaction with non-conjugated oil

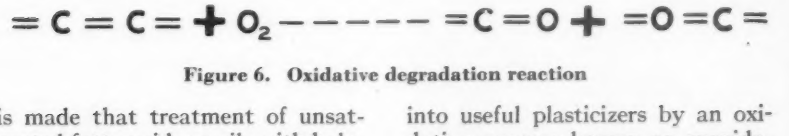


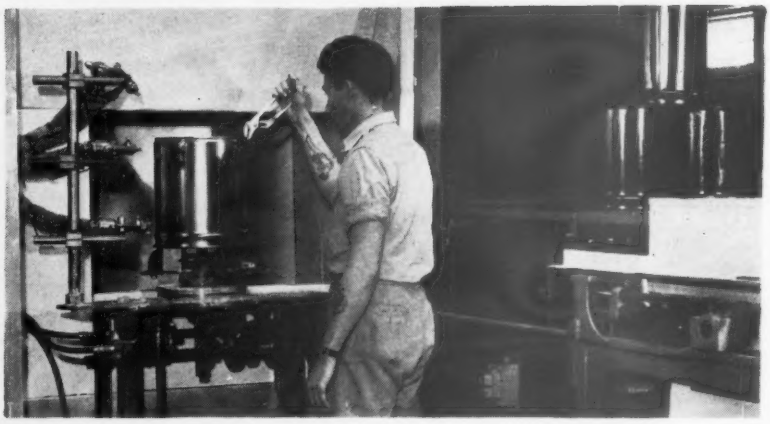
Figure 6. Oxidative degradation reaction

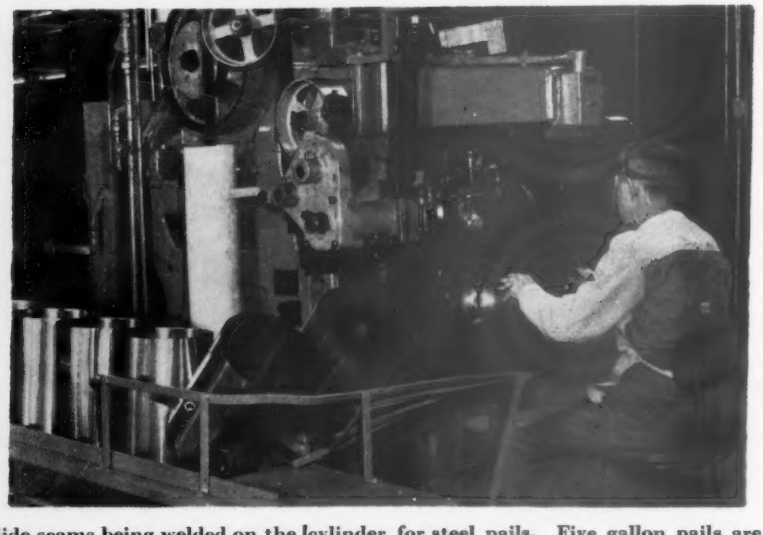
Portable varnish cooking kettle for manufacturing small batches

Jones & Laughlin Atlanta Plant Begins Steel Pail Production

A double seamer (left), fastens the bottoms on five gallon pails.

At paint spray booth(directly below), lacquer lining and exterior paint are applied to the pails.





Side seams being welded on the cylinder for steel pails. Five gallon pails are shown on the line.

THE Jones & Laughlin Steel Corporation, in Atlanta, Georgia, began production of steel shipping pails for southern manufacturers on March 3. Lacquer-lined and decorated steel shipping pails will be produced in ½ gallon and 5-gallon capacity.

The new line has been installed in Jones & Laughlin's 100,000-square foot building which replaced the company's former galvanized ware production facilities a little over a year ago.

Members of the Southern Paint and Varnish Production Club, meeting at the Atlanta Biltmore Hotel for their annual convention, visited the facilities at an "open house" which marked the official beginning of production.

They saw a swift, nearly automatic operation.

Sheets of cold rolled steel are split into body-size — that to the eventual size of the circumference of the body of the container. Then the edges are ground prior to welding.

In the next operation, a side seam welder makes a continuous lap weld. This completes the cylinder which is conveyed from the welder to a machine which "ducks in" one end and curls the other end of the cylinder.

It is then conveyed to an air-actuated swedging machine which expands the bead.

On the next machine the operator places the bottom on the shell, and the machine automatically makes a double seam, fastening the bottom to the shell.

Next, two "ears" to which the "bales" or handles will be fastened are riveted on the sides of the container near the top. Air is then injected at seven pounds pressure into the shell to test for leaks. Next, a conveyor takes the pail through a pre-heating unit to the automatic painting and lacquer-lining station. Here interior protective coating and the exterior paint are applied. Next stop is an an oven where the coatings are baked on at 420° F for 12 minutes.

After leaving the oven, the bales are attached, and a final visual inspection is made. The pails then are ready for shipment.

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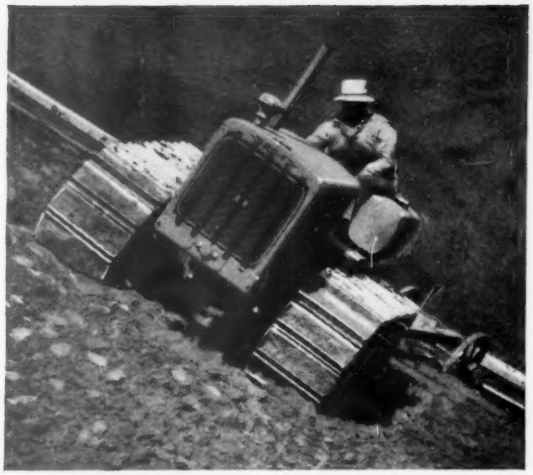

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PETROHOL 99
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Secondary Butyl Acetate
Isopropyl Acetate
Acetone
Methyl Ethyl Ketone
Dicyclopentadiene
Ethyl Ether
Isopropyl Ether
Naphthenic Acids
Iso-Octyl Alcohol
Decyl Alcohol
Denatured Ethyl Alcohol

CHEMICAL
PETROHOL 91
PETROHOL 95
PETROHOL 99
JAYSOL
Iso-Octyl Alcohol
Decyl Alcohol
Denatured Ethyl Alcohol
Tridecyl Alcohol
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NEWS

Joint Committee Set Up By Three Paint Groups

Representatives of the Painting and Decorating Contractors of America, Retail Paint and Wallpaper Distributors of America and the National Paint, Varnish and Lacquer Association met in Washington, D.C., March 8.

Subcommittees were appointed to report on apprentice training and to make recommendations to the full committee in reference to increasing the current apprentice training program. An additional subcommittee was appointed to investigate time payment selling and ways which this can be used to finance painting and decorating jobs. A subcommittee was also appointed to investigate sales training of personnel in the paint industry and to make recommendations to the main committee for action to provide a comprehensive sales training program. These committees will report to the main committee at its next meeting in July.

Representing the PDCA were R. H. Bohl, Columbus, Ohio and John B. Dewar, Pittsburgh, Pa.; representing RPWDA were Chet A. Watkins, Fort Lauderdale, Fla.; Richard A. Koretz, Chicago, Ill.; and Edmund L. Lewis, Liverpool, N. Y.; and representing NPV&LA were Joseph F. Battley, Washington, D. C.; Bernhard Mautz, Madison, Wis.; David H. Moran, St. Louis, Mo.; and William M. Stuart, Chicago, Ill.

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Expand Pigments Dept.

A construction project to increase the output of titanium dioxide pigments at the Edge Moor, Del., plant of Du Pont's Pigments Dept., was announced by the company. The work is expected to be completed next year but part of the new facilities will be in production before then.

The project will increase by about 25 per cent the production of "Ti-Pure" titanium dioxide pigments which are used in the manufacture of paints, plastics, etc.

"PVA Emulsion Paints" Panel Topic, April 14

"Polyvinyl Acetate Emulsion Paints," will be discussed by a panel at the April 14th meeting of the New York Paint and Varnish Production Club. The meeting will be held at the Brass Rail Restaurant, 100 Park Ave., New York City. Dinner will be served at 6:30 P.M.

The panel will be under the Chairmanship of Herbert E. Hillman, Technical Director of Eaglo Paint and Varnish Corp. and Vice Chairman of the Technical Committee. The program has been arranged so that each specialist will introduce his subject briefly, presenting it as a frame of reference for a general discussion session.

H. E. Hillman

Herbert Terry

N. G. Tompkins

J. W. Gallagher

L. R. Sherman

M. C. Londergan

The following will appear as panel members:

Herbert Terry, Technical Service Manager of Shawinigan Products Corp., will speak on the "Mechanism of Film Formation of PVA Emulsions." He will discuss the influence of emulsifier systems and plasticizers, the role of water, and the effect of particle size on film formation and film properties.

Norman G. Tompkins, Manager of Organic Products-Applications Research, Dewey and Almy Chemical Corp., will discuss "Vinyl Acetate Copolymers and Externally Plasticized PVA in Water Based Paints." He will compare the performance of "internally" plasticized copolymers with the post plasticized PVA films.

John W. Gallagher, Technical Service Representative, National Starch Products, Inc., will speak on "The Formulation of PVA Paints." He will consider the use of white and extender pigments; the contribution of surfactants; the action of preservatives, protective colloids, solvents, and defoamers; and the choice of corrosion inhibitors to control attack on the container during storage.

L. R. Sherman, Director of Technical Sales, Pigment Color Div., Imperial Paper and Color Corp., will talk on "Colored Pigments for PVA Paint Systems." He will discuss the principles to be considered in pigmenting PVA emulsions with various colored organic and inorganic pigments.

M. C. Londergan, Sales Promotion-White Pigments, E. I. DuPont de Nemours & Co., Inc., will discuss "The Performance of PVA Emulsion Paints in Exterior Exposure." Dr. Londergan will present data on chalking rate as a function of pigmentation; blister resistant performance; durability of PVA over masonry, stucco, and asbestos shingle. He will also discuss problems encountered in the exterior use of PVA, including staining over some woods, rusting under PVA when applied directly to steel, and loss of adhesion under some conditions.

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3½ - 4 - 5 - 7 gals.

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7. Your choice of 29-, 28-, or 26-gauge steel throughout. 2-panel bodies, press locked and doped. No leaking.
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10. Bottom bead prevents jamming in shipment or storage.

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NEWS

Organic Isocyanates Plant Planned by Nat. Aniline

Construction of a multi-million dollar plant to produce organic isocyanates at Moundsville, West Virginia, has been announced by National Aniline Division, Allied Chemical & Dye Corp. It is scheduled for early 1956 completion.

The plant will be a completely integrated organic isocyanates facility, with all chemical raw materials supplied from within the Allied Chemical organization, according to the announcement. It has been planned for production of a varied line of isocyanates, including the di-isocyanates of toluene (TDI), di-tolyl (TODI) and diphenylmethane (MDI), which are currently being supplied from National Aniline's interim commercial production at Buffalo, New York.

Located on the Ohio River, just south of Moundsville, the plant will have facilities for shipping river barge, railroad and truck.

Organic isocyanates, together with the polyurethane products made from them, have recently emerged as a broad new class of synthetic organic chemicals with important, large-volume potential as raw materials for the manufacture of improved synthetic rubbers, resins, plastics, adhesives, surface coatings and fibers. In addition, their unique reaction characteristics add new possibilities for improved products important to the automotive, aircraft, furniture, carpet, clothing, textile, construction and other industries.

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Appoint Cole & DeGraf

Barrett Division, Allied Chemical & Dye Corp., has announced that Cole & DeGraf will sell, service and stock its "Cumar" Resins in San Francisco. The resin is a coal-tar product used in the manufacture of a variety of materials such as varnishes, floor tile, adhesives, waterproofing materials and rubber products.

Paint Manufacturers Visit Nat. Starch N.J. Lab

Leading paint manufacturers in the metropolitan New York area visited National Starch Products' Alexander Research Laboratory in Plainfield, N. J., to acquaint themselves first hand with the company's research and exploration activities in the field.

Metropolitan paint manufacturers visit National Starch research labs.

Among the subjects discussed were polymerization; polymer testing critical pigment volume concentration studies of PVAc dispersions; various extender and formulation studies.

Those visiting the laboratory included Douglas Rattray, and Louis Monton, Canadian Industries Ltd.; Art Nortman, and Harry Naylor, Southern Clays; Max Cramer, Cheesman-Elliot; Alex Haber, Arnesto Paint; Jesse Young, Advance Solvents & Chemical Co.; Martin Wexler, Subox, Inc.; Charles Gardner, Witco Chemical Co.; Herman Singer, Lehmann Bros.; Bill Lawrence, Flood & Conklin, Inc.; Herbert Hillman, F. O. Pierce Co.; Elias Singer, Troy Chemical Co.; Ben Farber, Farnow Varnish Works; Norman Haber, T. J. Ronan Co.; Martin Miller, Landers-Siegel Co.; Al Wolk, Hoboken White Lead & Color (sub. I. Sonneborn); Ben Chatzinoff, 20th Century Paint & Varnish; Al Ronssak, Onyx Oil & Chemical Co.; Louis Cohen, Roberts Paint Co.; Julius Spector, National Chemical & Mfg. Co.

Du Pont to Build $500,000 "Freon" Research Lab

A half-million-dollar laboratory for research into "Freon" fluorinated hydrocarbon compounds and their applications in refrigeration, aerosols, plastics, and miscellaneous fields will be built by the Du Pont Co. at Chestnut Run, near Wilmington, Del.

Ground already has been broken for the new one-story and basement brick structure, with completion scheduled for early 1956. The new facilities, replacing smaller space at the company's Jackson Laboratory at Deepwater Point, N. J., will provide laboratory and office space for the "Kinetic" Chemicals Div. which manufactures a wide range of "Freon" compounds.

First floor of the building, to be constructed as a wing of a $2,750,000 rubber chemicals research laboratory authorized last month, will include general purpose two-man laboratories, aerosol loading laboratory facilities, refrigerant evaluation and special test area, and office space for a supervisory staff.

Separate facilities will be devoted to evaluation of new products, development and evaluation of new uses for established products, and new methods and equipment for testing and handling "Freon" compounds. Other laboratory areas will handle customer technical service and training of "Kinetic" sales personnel.

•

E. D. Griffin, Former PPG Vice President, Dies at 75

Emmet D. Griffin, 75, who advanced from the position of accountant with Pittsburgh Plate Glass Co. to that of director and vice president for the firm, died on March 4 in Pittsburgh.

Mr. Griffin retired as vice president in charge of the paint division during 1952 and as a director of the firm the following year.

Survivors include his widow, Blanche; two sons, Thomas V. and Emmet D., Jr., both of Pittsburgh; and one daughter, Mrs. H. H. Ayers, of Philadelphia, Pa.

dioctyl azelate

dimethyl phthalate

di-(methoxyethyl) phthalate

di-isobutyl phthalate

diethyl phthalate

dibutyl phthalate

di-isobutyl adipate

triacetin

tributyrin

di-(2-ethylhexyl) adipate

dioctyl phthalate (DOP)

di-isooctyl phthalate (DIOP)

Eastman plasticizers

As a leading supplier of quality plasticizers, Eastman is pleased to announce the addition of di-isooctyl phthalate to its line. Manufactured from a new, improved type of isooctyl alcohol, this plasticizer possesses the excellent qualities for which the present Eastman plasticizers are noted. It is available in drum, tank truck and tank car quantities. DIOP is only one of the many fine plasticizers made by Eastman. For further information on any of the plasticizers listed above, write or call your nearest Eastman representative.

Eastman
CHEMICAL PRODUCTS, INC.,
KINGSPORT, TENNESSEE
subsidiary of EASTMAN KODAK COMPANY

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tenn.; New York—260 Madison Ave.; Framingham, Mass.—65 Concord St.; Cincinnati—Carew Tower; Cleveland—Terminal Tower Bldg.; Chicago—360 Michigan Ave.; Houston—412 Main St.; St. Louis—Continental Bldg. **West Coast: Wilson Meyer Co.,** San Francisco—333 Montgomery St.; Los Angeles—4800 District Blvd.; Portland—520 S. W. Sixth Ave.; Salt Lake City—73 S. Main St.; Seattle—821 Second Ave.

DOW

Smash TV ad program helps you sell

LATEX PAINT

5 WEEKS ON MEDIC—NBC-TV

Winner of the Sylvania Grand Award for most outstanding TV show of 1954, MEDIC will tell the latex paint story to 20 million people per week.

8 WEEKS ON HOME SHOW—NBC-TV

Arlene Francis will tell the latex story from the woman's point of view to her HOME-conscious audience of 3 million women a day—every Friday beginning April 8.

8 WEEKS ON TODAY—NBC-TV

Dave Garroway, TV's supersalesman will show why latex paint is best to his loyal audience of 4 million per day, selling them before they leave the house for the day's buying—every Thursday beginning April 7.

Superior advantages of LATEX PAINT will be demonstrated to millions on three top TV shows

This year there is more profit than ever in pushing latex paint. Backed by the biggest promotion of its kind in history, the natural advantages of latex paint will be demonstrated to nearly every paint prospect in the country.

From January through May, the peak of the painting season, three top TV shows are showing why latex paint is best for professional, or do-it-yourself amateur. Sponsored by Dow, the major supplier of latex to the paint industry, this big campaign is designed for only one purpose: to make latex paint an even more profitable item for paint manufacturers and their dealers. It's the most powerful job of *pre-selling* ever done in support of the industry.

Sales records have confirmed the popularity of latex paint. Here is the program that will get *more people to paint more often.* That means more sales, more profit for you.

There's a wealth of tie-in opportunities to make this program work directly for you. Call your nearest Dow office or write to: THE DOW CHEMICAL COMPANY, Midland, Michigan, Plastics Sales PL 507E.

Plus* SELECTED MAGAZINES *All Year

SUNSET will tell why latex makes the best exterior masonry paints; selected trade magazines will sell latex paints to the professional market.

you can depend on DOW PLASTICS

DOW

NEWS

Catalyzed Materials Said To Provide New Coatings

One of the most important types of specialty finishes, rapidly revolutionizing finishing methods and providing completely new protective coatings, is catalyzed materials according to Harold C. Fornwall, equipment analysis engineer of The DeVilbiss Co., Toledo, Ohio.

Mr. Fornwall's statement was made recently to members of the Technical Sub-Committee of the Industrial Products Finishes Committee of the National Paint, Varnish & Lacquer Assn. at Boca Raton, Fla.

DeVilbiss, creator of a catalyst gun, claims to have developed an instrument that has enabled paint research chemists to continue experiments with catalyzed materials, eliminating the problem of "pot life."

One new aspect encountered with some catalyst materials is that during, the chemical reaction, heat which is produced serves to reduce the baking time and temperature cycles. This, Mr. Fornwall said, can mean the saving of many millions of dollars annually by elimination of a substantial portion of drying and baking equipment. The catalyzed material also reduces the number of coats required and the curing time between coats.

Citing the experience of one manufacturer, Mr. Fornwall said that six coats of material formerly were applied to laboratory bench tops, reagent racks and furniture to provide an acid resisting protective coat. Today, epoxys applied with the DeVilbiss catalyst gun are accomplishing the same end-result with greater protection in two coats, he said. The manufacturer previously had to allow 24 hours drying time between coats where today he has a two hour drying period between coats and allows 12 hours curing before shipment. The reduction in cost, increased efficiency and greater utilization of production space is just one example of the revolutionary effect that catalysts are expected to have, he added.

The DeVilbiss catalyst gun deviates from the adage, "Two heads are better than one," because it has only one. A forerunner in the catalytic finishing field had two heads, one for resin and the other for catalyst. Results were not up to expectations because of the unreliable dispersion of catalyst with resin. In the new gun, mixing of catalyst and resin are done outside of the air cap.

•

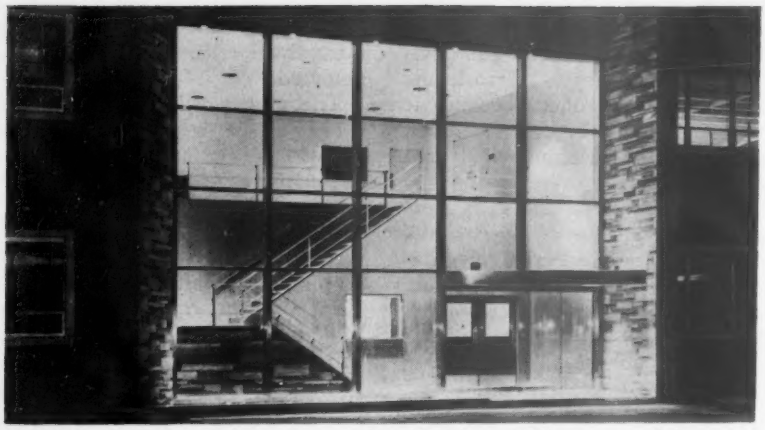
Atlas Powder to Award Eight $1000 Scholarships

Atlas Powder Company will award eight $1,000 college scholarships again this year, Ralph K. Gottshall, President, has announced.

The grants will go to students who will be seniors during the 1955-56 college year, majoring in chemistry or any branch of engineering.

The program will be administered by the Atlas committee on scholarships, headed by Dr. Thomas Kennedy, the company's director of industrial and public relations.

The grants will be used to pay tuition, board, travel and other senior year costs, as approved by the student's college. Winners will be announced May 15.



The Crown Cork & Seal Company's Can Division will have one of the most modern metal lithography plants in the country when facilities are completed in Philadelphia. The plant will operate with five modern litho presses and ovens and five recently designed coaters and ovens.

NEWS

Milton Goll Associates To Represents Oil Co.

Establishment of Milton Goll Associates, Livingston, N. J., to act as special representative for the Scientific Oil Compounding Co., Chicago, has been announced.

Milton Goll

Mr. Goll, former chief of the Microbiological Laboratory of Nuodex Products Co., said his company will also represent other basic manufacturers of fungicides, bactericides and anti-microbial agents for the paint, textile, plastic and adhesive industries.

"An important part of our company operation is a free consulting and laboratory service offering sound technical advice for solving preservative problems and utilizing modern and complete microbiological and chemical laboratories," said Mr. Goll.

Prior to his connection with Nuodex, Mr. Goll was Chief Bacteriologist of Schwarz Laboratories, Mt. Vernon, N. Y., consulting chemists to the brewing and fermentation industries.

•

Says Paint to Prosper

All indications are that American paint manufacturers, distributors and contractors will continue to prosper in the continuing expansion of the country's economy, according to a recent statement by David H. Moran, Chairman of the executive committee of the National Paint, Varnish and Lacquer Association.

Speaking at a meeting of the executive committee of the Los Angeles Paint, Varnish and Lacquer Association, Moran, who is president of the Reardon Co., cited the continuing building boom as evidence that the industry should continue to enjoy a high level of prosperity in the years immediately ahead.

NEWS

Southern Club Meeting Attended by Over 500

Over 500 persons attended the Southern Paint and Varnish Production Club's 19th annual convention at the Atlanta Biltmore Hotel March 2-4.

The group was made up of members and suppliers to the paint manufacturing industry and the percentage of paint manufacturers represented was more than double that of previous years.

Don D. Wyatt, Minnesota Paints, Inc., was elected president for the ensuing year. Other newly elected officers are P. W. Layman, Piedmont Paint Mfg. Co., Greenville, S. C., president-elect; Ross McKenzie, Southern Coatings & Chemical Co., Sumter, S. C., vice-president; John Rayfield, Industrial Paint Mfg. Co., Birmingham, Ala., secretary-treasurer.

Members of the Executive Committee are: Dick Ashley, Gilman Paint & Varnish Co., Inc., Chattanooga; A. W. Lynch, Art-Cement Mfg. Co., Miami; Robert McGoogan, Dixie Paint & Varnish Co., Inc., Brunswick, Ga.; C. B. Thomas, Thomas Paint Products, Atlanta; Ed Steinhoff, Standard Paint & Varnish Co., New Orleans, and Ed Davis, Marietta Paint & Color Co., High Point, N. C. John J. Hughes, Jr., Mobile Paint Mfg. Co., Mobile, was elected Council delegate.

The initial session was opened by M. J. Catena who introduced Newell P. Beckwith, president of the Federation of Paint and Varnish Production Clubs. Mr. Beckwith introduced other members of the Federation and then recounted the activities of the Southern club which had been of service to the Federation and the industry in general.

Among the services cited, was the work done by the club in making $500 scholarships available for the Paint Course at the University of Florida. He spoke of the growth of the Southern club, and particularly the large attendance he noted during his recent visit to an Atlanta Section meeting.

Mr. Beckwith also gave a short history of the Federation and extended an invitation to the annual convention to be held Oct. 2-6, in New York City.

Clyde L. Smith, president-elect of the Federation, spoke of the necessity for active committee work by members of the Federation during the year. Mr. Smith's main function is to appoint committees.

Milton A. Glaser, Federation treasurer outlined the technical activities presently sponsored by the Federation. They include research on the pure Compound Project which will probably be presented in book form when work is completed; the Corrosion Project; and a list of paint courses available around the country.

C. Homer Flynn gave a progress report on the Color Aptitude Test.

Laurence Kiefer, representing the National Paint, Varnish and Lacquer Association, spoke of the work now being done to combat the unfavorable publicity given the paint industry in the "lead poisoning" cases.

R. S. McKenzie presided over the session. He introduced Dr. W. G. Vannoy, Pigments Dept., E. I. du Pont de Nemours & Co.,

who spoke on "New Trends in Colored House Paints." The talk was graphically illustrated with color slides.

Dr. Vannoy stated that a survey showed the use of bright house paint had increased from 25 percent in 1950 to 28 percent in 1952. He used four bases for house paint tested: oil, alkyd, PVA, and acrylic emulsion. Tests were made on wood, asbestos shingles, and cement surfaces.

Excellent exterior finishes may be obtained with PVA and acrylic emulsions, showing good fade resistance and adhesion. Bright colors of exceptional merit may be obtained with phthalocyanine blue and green, parachlor red, toluidine yellow and nickel Azo complex yellow.

John C. Moore, director of the Scientific Section, National Paint, Varnish and Lacquer Association, spoke on "Technical Activities of the National Association." Some of these activities included studies on: "The Moisture Problem"; "Fire Retardant Paint"; "Redwood Finishes"; "Adhesion to Wet Wood"; and "Standards for Testing Methods." The Association is now furnishing a "Guide" for government specifications of material pertinent to the industry and is cooperating in promotion work aimed at attracting more qualified people to the industry.

Raymond Tooke, of Georgia Tech, spoke on the recent work done on the Southern Club's project, "Painting of Southern Yellow Pine."

Two audience participation programs wound up the meeting. A round table discussion on "Exterior Masonry Paint," was moderated by John C. Moore, of National Paint, Varnish and Lacquer Association, with panel members representing raw material manufacturers of both new and traditional products for masonry surfaces. These included: A. E. Polson, sales service manager, Chemical Division of the Goodyear Tire & Rubber Co., Inc.; Gerould Allyn, The Resinous Products Division, Rohm & Haas Co., Hall Dillon, manager, technical service, Archer-Daniels-Midland Co., H. P. Beardsley, Vinyl Product Division, Electrochemicals Department, E. I. du Pont de Nemours & Co.; F. K. Quigley, Jr., coatings technical service, The Dow Chemical Co.; Norman G. Tompkins, organic products applications research, Dewey & Almy Chemical Co.; Benjamin D. Zmuda, director of research, The Reardon Co.

The annual Open Forum was conducted by "Colonel" Billy Hood, assisted by Parker Layman and John Rayfield.

•

L. Lammiman, 59, Dies; Paint Spray Authority

Lewis W. Lammiman, 59, director of technical services for the DeVilbiss Company, Toledo, Ohio, died on February 27.

Mr. Lammiman directed the activities of customer advisory services on technical matters and the company's spray painting school. Mr. Lammiman was recognized as a leading authority on the solution of production and finishing problems involving paint spray equipment and materials.

He was widely acquainted in the automotive and furniture industries where he was able to correct painting difficulties quickly to the amazement of the spray operator and management. His theory was to eliminate lost motion.

VELSICOL RESINS

AD·21
AB·11·2

For High Lustre, Good Leafing Aluminum Paints

Velsicol Resins AD-21 and AB-11-2 are especially suitable for economical excellent quality aluminum vehicles and ready-mixed aluminum paints. These neutral hydrocarbon resins are soluble in both aliphatic and aromatic naphthas, and are compatible with bodied vegetable and marine drying oils. They impart fast-drying characteristics. Solutions of the resins have high surface tension properties which promote leafing and flooding of aluminum pigment. The non-acidity of the solutions favors long leaf retentivity. AD-21 and AB-11-2 are available in either solid or solution form. For information and advice about their use, write to the Velsicol Corp. Technical Department.

OTHER SUGGESTED APPLICATIONS FOR VELSICOL RESINS

- Floor and trim vehicles.
- General utility varnishes.
- Traffic paints.
- Extenders for 100% oil soluble phenolic resins.
- Extenders for Chlorinated rubber.
- Metal primers.
- Drum coatings.
- Decorative can enamels.
- Grinding liquids.

PROPERTIES

- Low degree of solvent retentivity.
- Non-acidic.
- Non-saponifiable.
- Coatings resistant to water, aqueous acids and alkalis.
- Soluble in aliphatic and aromatic naphthas.
- Compatible with vegetable and marine drying oils.
- Vehicle films are hard, flexible and adherent.
- Resin solutions promote excellent leafing and flooding of aluminum pigment.

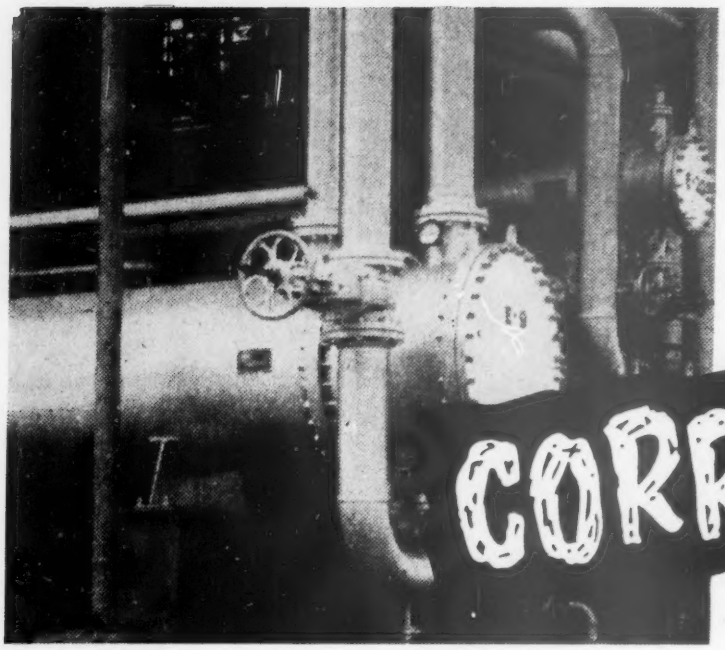
PETROLEUM DERIVED CHEMICALS
VELSICOL
SERVING BASIC INDUSTRIES

VELSICOL CORPORATION

General Offices and Laboratories
330 East Grand Avenue, Chicago 11, Illinois

Export Division
100 East 42nd Street, New York 17, New York

REPRESENTATIVES IN PRINCIPAL CITIES



PROVEN PROTECTION against CORROSION

Marbon "9200"®

Soluble High Styrene Paint Resins

You can depend on Marbon "9200" Enamels for complete protection against corrosion. Excellent alkali and acid resistance plus good adhesion make tough and abrasion-resistant Marbon "9200" Enamels the perfect answer for protecting duct work, piping, tanks, cylinders, etc. against acid pickling solutions and acid vapors; alkaline salts, strong cleaning solutions, oil and grease. Marbon "9200" Enamels are easily applied, easily maintained and are rapid drying.

MARBON "9200" HV
for low vehicle solids at higher viscosity

MARBON "9200" MV and LV
for general use

MARBON "9200" LLV
for high vehicle solids at lower viscosity

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Division of BORG-WARNER CORPORATION
GARY, INDIANA

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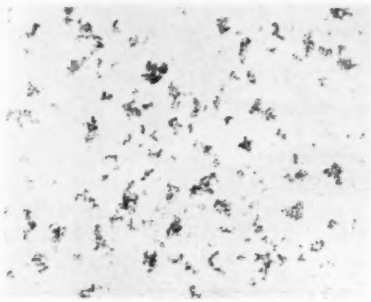
NEW MATERIALS & EQUIPMENT

A MONTHLY MARKET SURVEY

This section is intended to keep our readers informed of new materials and equipment. While every effort is made to include only reputable products, their presence here does not constitute an official endorsement.



CABOT

SILICEOUS PIGMENT

Varied Uses

"Cab-o-sil" is a white and almost chemically pure siliceous pigment, claimed to be different from other silicas because it is made differently.

The following functions are claimed for the product by the company:

Suspending agent: the "can stability" of paints can be improved with the use of 0.1 - 2% of the product which retards the settling of high density pigments.

Flatting agent: flat varnishes have been formulated with 18% of the product (based on total solids) to give 60° glossmeter readings of 35 on black carrara glass.

Thickening and gelling agent: the following percentages of the product by weight are required to produce soft gels with the corresponding liquids listed in order of decreasing polarity: 12% in water; 11% in ethylene glycol; 9% in butyl alcohol; 8% in turpentine; 7% in benzene.

Thixotropic agent: the addition of 1% of the product to a non-thixotropic polyester resin has increased the viscosity from 410 centipoises (Brookfield viscosity) to 8,000 centipoises at 2 r.p.m. and 3,500 centipoises at 3,500 r.p.m.

Antislip agent: antislip properties can be imparted to solvent base floor waxes.

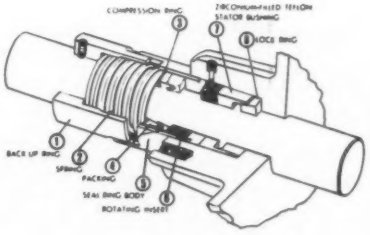
Transparent extender: the addition of 3.5% of product to a polychromatic automotive enamel permits adjustment of total pigment volume content to optimum durability without changing the transparency, color or general appearance of the dried film.

White Pigments Div., Godfrey L. Cabot, Inc., Boston, Mass.

MECHANICAL SEAL

For Slurries

Style "WLZ" Chempro wedge-lock mechanical seal, is made with the stator bushing fabricated of Zirconium-filled Teflon molded on pure Teflon. This new stator bushing is said to permit the seal to operate under slurry conditions that previously could not be sealed by a mechanical seal. It is also used for operations where carbon cannot be used because of the chemical properties of the material being pumped or mixed.



CHEMICAL & POWER

The seal is designed for complete interchangeability with stuffing box packing in pumps and other rotating processing equipment. Available in standard shaft sizes for economical interchangeability of seals and parts.

Chemical and Power Products, Inc., 11 Broadway, New York 4.

LABELER

For Round Containers

A semi-automatic labeler for round containers has new features which include an automatic label feed and a pivoted frame that opens for easy cleaning. The machine is designed for ease of operation and will handle a wide range of container sizes.

ATLANTIC

It is claimed that this machine lessens to a matter of minutes the time required for changing from one size container to another. The automatic label feed reduces the operator's work to simply removing the labeled cans or bottles from the machine. Light weight, corrosion-resistant materials are used throughout, making the machine durable and easily portable. The Atlantic Supply Co., Baltimore, Md.

ALGINATES

For Emulsion Paints

Now available are supplies of "Protatek 1053" sodium alginate and "Protamon" ammonium alginate for use in water and oil emulsion paints based on glue and casein and also in polyvinyl emulsion paints.

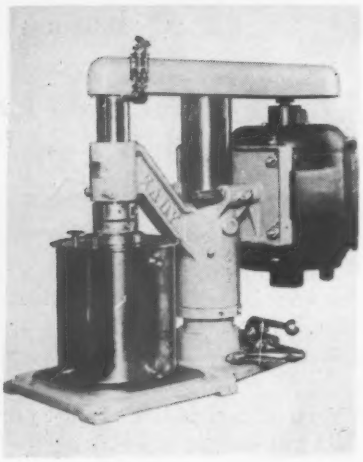
According to the manufacturer, alginates offer the following advantages:

Improved can stability; improved brushing characteristics; improved wetting of pigments. Croda Inc., 51 Madison Ave., New York 10, N. Y.

NEW
MATERIALS — EQUIPMENT

LAB DISPERSION MILL
For Test and Pilot Work

An improved laboratory model mill for test and pilot dispersions is the same as the high speed, kinetic, plant scale "Kady" mills in principle. The work of dispersion is done by kinetic energy. A solid agglomerate in a liquid carrier is accelerated very rapidly by a rotor within a slotted cylindrical stator. The solids impinge against the slots and are said to be effectively dispersed without the use of "shear" or the reliance on close tolerances between moving parts under pressure. Thus the mill is claimed not to be subject to loss of efficiency from wear.



KINETIC

Company says that recent successful applications of these mills include chemicals and protective coatings. In chemical processes they provide important uses with high-speed reactions as well as with slurries, emulsions and mixtures. It has also been applied to pigment and resin dispersion in all types of protective coatings.

The capacity mill is ⅓ to ½ gal. (U. S.) Results obtained from materials and formulations in it are directly projectible in the plant. The mill is stainless steel in all working parts. It is bench mounted, occupying 25½" by 15¼" maximum. In height it requires less than 30" including the lift in retracting the dispersion head from the container. The lift is hydraulic. The motor is 1 HP, 3 phase, 220/440 volt, explosion proof. The mill arrives ready to operate upon connection to electric power and water. Kinetic Dispersion Corp., 95 Botsford Pl., Buffalo 16, N. Y.

POLYETHYLENE GLYCOL
For Color Supensions

"Carbowax polyethylene glycol 20M," with an estimated molecular weight of 15,000 to 20,000, is now available in carload quantities.

Company says product is a water-soluble, white solid with the binding, suspending, and lubricating properties typical of the polyethylene glycol compounds. Both the melt viscosity and aqueous solution viscosity are said to be considerably higher than those of the highest molecular weight compounds heretofore available. Films formed with product are claimed stronger and harder than those formed with other solid polyethylene glycols.

The product's solution viscosity is said to be about twice that of equivalent gum arabic solutions. This suggests its use in colored pigment suspensions, aqueous based inks, and other preparations where mild thickening action combined with suspending power is desired. Carbide and Carbon Chemicals Co., Div. of Union Carbide and Carbon Corp., 30 East 42nd St., New York City 17, N. Y.

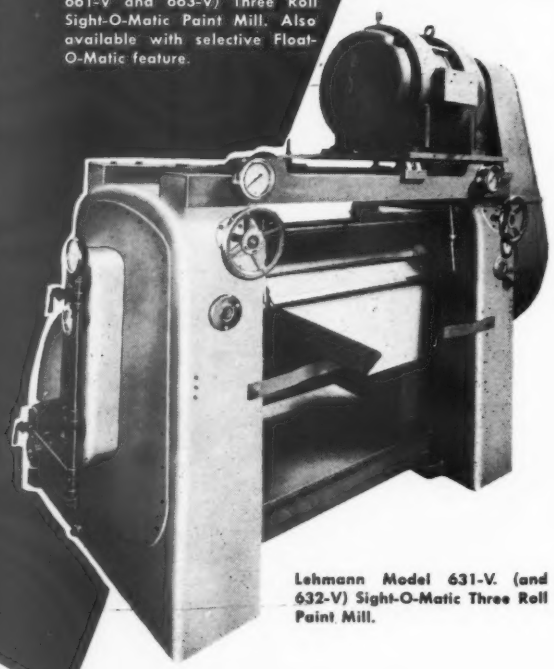
THESE COMPANION PAINT MILLS CAN DO THINGS TO YOUR COSTS

No plant is too large or too small for the high production economy pair —the 631-V Vertical and the 662-V Horizontal Three Roll Paint Mills. Together they reduce paint milling costs to a point that no other combination of mills has reached.

Both of these mills are equipped with Sight-O-Matic* Control, making roll adjustments simpler, faster, and more accurate.

Lehmann is glad to offer you milling research service on your paint formulations, without obligation. Just send us samples, state your problem, and we will undertake to find the answer.

Lehmann Model 662-V (also 661-V and 663-V) Three Roll Sight-O-Matic Paint Mill. Also available with selective Float-O-Matic feature.



Lehmann Model 631-V. (and 632-V) Sight-O-Matic Three Roll Paint Mill.

Do any of your mills need factory reconditioning? Lehmann has cut mill out-of-service time by at least one-half by the recent addition of many modern machine tools and new techniques. Phone or write for details.

*Reg. U. S. Pat. Off.

LEHMANN®

J. M. LEHMANN COMPANY, Inc.

MAIN OFFICE AND FACTORY: 558 NEW YORK AVE., LYNDHURST, N. J.

NEW MATERIALS — EQUIPMENT

PRESSURE-SENSITIVE LABEL
For Returnable Containers

For those receiving returnable containers company now supplies large white pressure-sensitive labels on which is printed "Returnable Container—Do Not Destroy" (or similar phrase). Other data is also printed on the labels, followed by spaces for writing-in necessary information.

LABELON

The label material is the company's brand of flagback tape which is said to stick without moistening to any smooth, dry surface and which can be written on with pen, pencil or crayon. It can be stripped off without leaving a mark when its usefulness has been fulfilled. Also, the tape will withstand heat temperatures up to 250°F., according to the company.

They are sold in rolls of tape 3″ wide by 1080″ long. Each label is 3″ x 18″ and is perforated for easy removal. Samples can be secured on request from the Labelon Tape Co., Inc., 450 Atlantic Ave., Rochester 9, N. Y.

BODIED LINSEED OILS
For Exterior Paints

The "Econ-O-Lins" are claimed to be a series of three good quality, economical, heat bodied linseed oils with excellent properties where color is not of the greatest importance. Company recommends its use for house paints; exterior trim paints; darker colored varnishes and other vehicles. According to the company, the paint bleaches on drying to offset the fact that it is not quite as white in the can or immediately following application. The resulting paint film is equivalent in color to a paint made with a bodied oil conforming to Federal Specification TT-O-367, Type I. Archer-Daniels-Midland Co., 700 Investors Building, Minneapolis 2, Minn.

AMORPHOUS SILICA
Flatting Agent in Paints

"QUSO," a new form of amorphous silica, has a particle size of about 15 millimicrons. It is a white, free-flowing powder of extremely light weight and has a surface area that can be varied between 135 and 215 square meters per gram. It is available in either mildly alkaline or acid condition (pH from 6.0 to 9.0) depending on the user's requirements. It is hydrophilic, heat stable, completely insoluble and has high oil absorbency.

Company says that the finely divided silica can be dispersed in oils and other organic media by milling with shearing action or by mixture with certain additives. Typical applications are as a flatting agent in paints, enamels, varnishes and lacquers, as a thickening and bodying agent in inks and lubricating greases, as a reinforcing additive for resins and plastics. Philadelphia Quartz Co., Public Ledger Building, Independence Sq., Philadelphia 6, Pa.

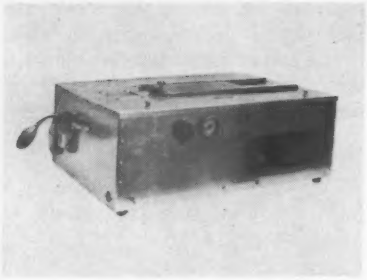
NEW MATERIALS — EQUIPMENT

BLUSH CABINET

Provides Fast Readings

Cabinet has been designed to enable users and manufacturers to determine the blush resistance of their lacquers with the maximum speed and accuracy. Readings of temperature and humidity are made directly, no calculation being required. The apparatus is compact, light and portable. Operation technique is simple and positive results easily obtainable, according to the manufacturer.

Cabinet is constructed of 1/16" aluminum with an overall dimensions 10" x 20" x 30". Shipping weight is approximately 40 lbs.



GARDNER

Humidity is adjusted by injecting water mist as necessary through an atomizer. The latter is fed by a small glass reservoir containing enough distilled water to last several complete determinations. Air pressure to the atomizer is supplied either by a rubber squeeze bulb or more conveniently by connection to a compressed air line. Company says this method enables a relative humidity of 80% to be produced within the cabinet in about 5 minutes. Adjustments above or below this humidity are said to be made in less than 2 minutes. Relative humidity is indicated directly with ±1% by a Serdex hygrometer located in the top of the cabinet near the panel slot.

Air circulation and purging is accomplished by means of a motor blower with variable intake thus providing a slow circulation of humid air or a rapid purging of the air in the box when the Plexiglas inspection doors on top and front of the cabinet are open.

Temperature is thermostatically controlled, heat being provided by four 15 watt bulbs located on the floor of the chamber. By manipulating the thermostat in conjunction with the dial type thermometer, company says any desired temperature from room temperature to 120° F. can be maintained to within 1° F.

The panel rack will accomodate a 3" x 5" panel. A Plexiglas door near the panel rack permits observation during tests.

Gardner Laboratory Inc., 4723 Elm St., Bethesda 14, Md.

EPOXY CURLING AGENT

Modified Amine Type

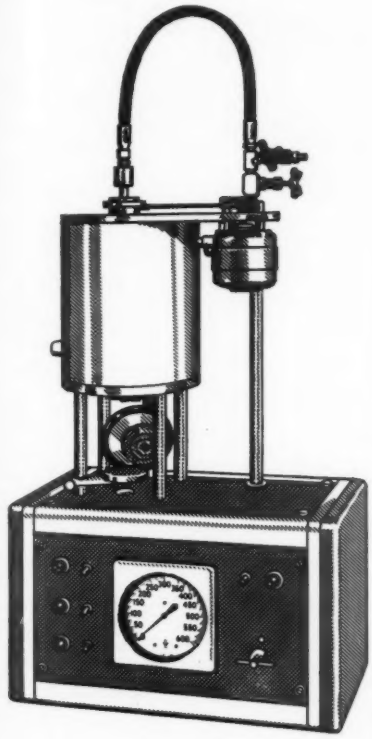
A modified amine curing agent, "Experimental Curing Agent U," is claimed to be particularly useful in epoxy castings, potting and adhesives and laminating applications where room temperature or moderately elevated temperatures of curing are desired. It is expected to find widest usage with the lower molecular weight resins, particularly "Epon 828," although it can be used with all "Epon" resins, according to the company. In all applications the low vapor pressure is said to minimize the odor associated with unmodified polyamines. A data sheet is available upon request. Shell Chemical Corp. 50 W. 50 St., New York City, N. Y.

NEW MATERIALS — EQUIPMENT

EXTRUSION RHEOMETERS

Measures Viscosity

"Castor-Severs'" extrusion rheometers are offered for the measurement of viscosity at high rates of flow in control, formulation, research and production processes.



BURRELL

Company says the new line are complete unit-package instruments delivered ready for use as reliable tools for the accurate measurement of viscosity of coatings, adhesives, pastes and plastisols in the fields of paint, resins, chemicals and wherever else thickness of material may be a factor.

Seven models operate over a wide range of temperatures from room temperature to 300°C. and at pressures from atmospheric to 3000 p.s.i. Special attachments permit operation at temperatures as low as -40°C and pressures up to 5000 p.s.i. Reproducible accuracy is obtained from 1 centipoise to over 5 billion centipoises.

Operation is called simple in method and practice. Air pressure is applied to a material chamber. Samples being tested are timed and measured as they are extruded through a calibrated orifice. The units are claimed to be easy to set up, easy to operate, dismantled and cleaned quickly.

Company claims that increased productivity per man hour in the laboratory, acceleration of processes and improved maintenance of reproducible standards in plant operation are some of the values inherent in the equipment.

Burrell Corp., 2223 Fifth Ave., Pittsburgh 19, Pa.

FORMALDEHYDE

High Concentration

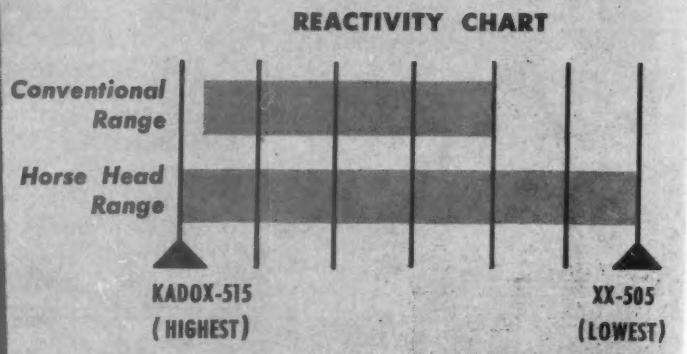
Formaldehyde is used principally in the resin and plastic fields. At the company's new facilities, recently placed in operation, higher concentration formaldehyde is being produced. It is manufactured from methanol which is produced at that location from natural gas.

The new facilities, utilizing a process developed in laboratories of Nitrogen Division, can produce formaldehyde in concentrations up to 50 percent, as may be necessary to meet customer's requirements, reflecting increasing demand for higher concentration product. Formaldehyde was previously made here in concentrations of 37 and 45 percent. The capacity of the plant has also been substantially increased. Nitrogen Division, Allied Chemical & Dye Corp., South Point, Ohio.

TO FORMULATE FASTER AND BETTER with lead-free Zinc Oxides...

CHOOSE the REACTIVITY

You Need from the HORSE HEAD family



NEED HIGHEST REACTIVITY... for better body?
Try Kadox. It's exclusive — available only in the Horse Head family.

NEED LOWEST REACTIVITY... for industrial finishes?
Try XX-505. It's another special Horse Head oxide.

NEED THE MOST COMPLETE SELECTION OF LEAD-FREE ZINC OXIDES to build formulas faster and better?

TRY THE HORSE HEAD FAMILY

— most used by paint manufacturers since 1860.

HORSE HEAD PRODUCTS

THE NEW JERSEY ZINC COMPANY

Producers of Horse Head Zinc Pigments . . .
most used by paint manufacturers since 1860
160 FRONT STREET, NEW YORK 38, N. Y.

NEW MATERIALS — EQUIPMENT

PETROLEUM RESINS

Wide Compatability

"Kermac Resin 641" is said by the company to possess the following general characteristics: solubilities above 99.5 percent in carbon disulfide; absence of volatile and oily components; very little of the usual gelling and bodying tendencies; lower initial viscosity and exhibits lower rate of viscosity increase when dissolved in low solvency naphtha; maximum stability and resistance to weathering since no destructive distillation occurred in its processing; nearly neutral, inert to common formulation ingredients, including aluminum powder; successfully integrated with widely different materials such as ester gums, coumarone-indene resins, gum and wood rosins, crude tall oil, and varnish maker's drying oils.

Company also recommends "Kermac Resin 640" which has a softening point range of 265/285°F. with very low penetration values. Uses and properties said to be comparable to "Kermac Resin 641"; "Kermac Resin 625" said to have a softening point range of 150/170°F. with very low penetration values. Company says that applications are apparent where adhesiveness, ease of processing and wide compatability become factors; "Kermac Oil 650" with a viscosity range of 370/420 Saybolt Furol Seconds @ 210°F., claimed to show promise as a linseed oil extender and base. Company says it can be used with excellent results as a good-leafing, non-staining, ready-mixed aluminum paint vehicle. Compatability said to be excellent with a wide range of resins and drying oils. Kerr-McGee Oil Industries, Inc., Refining Sales Div., Kerr-McGee Building, Oklahoma City, Okla.

CONDITIONING OVENS

For Moisture Determination

The "Freas Conditioning Ovens" used in moisture determination tests of paint pigments, soap, textiles, leather, paper, grain, tobacco, wood, rubber, glue, dairy products, clay, and other materials have been redesigned. The ovens are said to have been provided with new balances to obtain greater accuracy, permitting moisture determinations from 30% to 0.1%. Other features claimed includes an insulated platform above the oven to prevent heat from affecting the sensitivity of balance; new inner door of "Herculite" plate glass permiting observation of samples during conditioning in the Model 201 Oven; controls, heaters, insulation, thermostats and same general construction as in standard models of Precision-Freas Ovens. Available in "Model 200," a gravity convection, non-selective suspension, and "Model 201," a mechanical convection, selective suspension. Literature is available on request from Precision Scientific Co., 3737 W. Cortland St., Chicago 47, Ill.

VEHICLE

For Interior Flats

"Maltol A" is a vehicle whose primary use is said to be in the manufacturing of interior flat paints. The company considers that this product represents a change in treatment of oils for the manufacturing of protective coating vehicles. The paints and their films are claimed to possess several features to warrant their being used extensively. Mahler Industries, Inc., Linden, N. J.

reaction with maleic anhydride and related compounds. With conjugated oils, the familiar Diels-Alder reaction takes place, (See Figure 7).

With non-conjugated oils, the addition results in the formation of an alkenyl succinic acid anhydride. (See Figure 8)

rene was the earliest large volume monomer available, styrenated products are most familiar today.

Under suitable conditions, styrene can be copolymerized with drying oils with or without the presence of solvents. The precise mechanism of this well publicized reaction is still the subject of controversy. The copolymers in general are fast drying, have good water and alkali resistance, fair durability, poor resistance to aromatics, and poor compatibility with

Table III

COMPOSITION AND PERFORMANCE OF VARNISHES vs. AIR-DRYING ALKYDS

Ingredients and Characteristics	Varnish	Alkyd
Type of oil	Good drying oils, little or no semi-drying	Considerable use of semi-drying oils
Type of resin	Considerable variation	Chiefly glyceryl phthalate
Solvents	Chiefly aliphatic	Aliphatic and aromatic
Driers	Pb, Co, Mn, Ca, cooked in batch or added afterwards	Pb, Co, Mn, Ca, added to finished alkyd
Resistance to skinning	Bad to good	Fair to very good
Air-drying	Very good through-drying	Fair through-drying
Water resistance	Poor to excellent	Fair
Alkali resistance	Very poor to excellent	Very poor to fair
Color	Very poor to good	Good to excellent
Gloss	Good to excellent	Good
Adhesion	Excellent	Excellent
Embrittlement with aging	Poor to good	Fair to very good
Exterior durability	Poor to good	Good to excellent

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In either case, the functionality of the oil is increased. Maleic modified soya bean oils can be used partially to replace linseed oil in house paints or varnishes producing thereby pale durable films.

Copolymerization

With the increasing availability of numerous vinyl type monomers such as styrene, vinyltoluene, acrylonitrile, methyl methacrylate, etc., efforts to copolymerize them with drying oils and drying oil derivatives have been made with considerable success. In general copolymerizations occur more readily with oils containing conjugated unsaturation. Since styother film forming finishes.

As the number of monomers increase in availability, and the techniques of copolymerization are refined, the number of useful copolymers should become almost infinite.

Obviously the possibilities of chemical transformations are as broad as the scope of modern chemistry. The variations and forms of oleochemicals are limited only by man's initiative, ability, and imagination.

Next month we will conclude this series by briefly surveying autoxidation and drying mechanisms common to oils and oil derivatives.

Now we make latex-base interior paints with regular equipment in 3 easy steps

With Cargill EVT-50 we can manufacture a superior flat latex-base paint on standard plant equipment just as easily as we now make conventional oil-based paint. Costly and troublesome steps are eliminated!

Because Cargill EVT-50 is a stable, *uniform* vehicle with controlled particle size, we can manufacture paint of *consistently uniform quality* . . . every batch the same.

Cargill EVT-50 contains both synthetic latex and oleoresinous polymers—balanced to give the best properties of each.

With this complete vehicle we can turn out more and *better* interior paint, with amazing durability and adhesion on all interior surfaces, including wood. When dry, the film is more permeable to water vapor than conventional latex-base paints.

HERE'S HOW CARGILL EVT-50 SAVES UP TO 60% PRODUCTION TIME

CONVENTIONAL LATEX METHOD	EVT-50 METHOD
• Cook Casein	• Disperse Pigment
• Emulsify Alkyd (Optional)	• Mix
• Dissolve Preservative	• Package
• Disperse Thickener	
• Grind Pigment	
• Mix	You eliminate 4 steps!
• Package	

Want more facts? Send the convenient coupon below for complete information on Cargill EVT-50. There is no obligation, of course.

Cargill, Inc.
Vegetable Oil Division
600 L1 Flour Exchange Bldg., Minneapolis 15, Minn.

Name_____

Company_____

Your Position_____

Street Address_____

City_____ Zone____ State_____

PERSONNEL CHANGES

AMERICAN CYANAMID

L. C. Duncan has been appointed General Manager of the company's Lederle Laboratories Division, and **V. E. Atkins** has been appointed General Manager of the Organic Chemicals Division, it was announced by K. C. Towe, President.

D. M. Benjamin, former Executive Director of Lederle Laboratories Division, was named Assistant General Manager.

Mr. Duncan was formerly General Manager of the Organic Chemicals Division of which Mr. Atkins was Assistant General Manager. Mr. Duncan began his business career in the Accounting Department of the Ohio Oil Co. In 1937 he became Associate Editor of *Barrons Weekly*, then from 1941 to 1945 served in the U. S. Army, reaching the rank of Lieutenant Colonel.

He joined the company in 1945, as head of the Procedures Department, was named head of the Priorities and Allocations Department in 1950, and the following year became Assistant to the President. Four years later he was named General Manager of the newly formed Organic Chemicals Division.

Mr. Atkins was associated with the B. F. Goodrich Co. in Ohio from 1915 to 1929 as Manager of its chemical operations in south Akron. From 1929 to 1935 he was with Seiberling Rubber Co. in Ohio as Vice President in charge of production.

He joined Cyanamid in 1936 in its former Calco Chemicals Division at Bound Brook, N. J. as General Superintendent of Manufacturing of Intermediate Chemicals. He was named Assistant Works Manager in 1940, and three years later became Works Manager. In 1947 he became Manager of Manufacturing of the division, and in 1954 was appointed Assistant General Manager of the newly formed Organic Chemicals Division.

Mr. Benjamin joined the company's Accounting Department in 1934. He transferred to the Lederle Laboratories Division at Pearl River in 1940 as Plant Accountant, was named Comptroller of the division in 1950, and Director of Administration the following year. In 1954 he was appointed Executive Director.

Robert T. Schoepflin was appointed Midwest Sales Representative for the Arizona Chemical Co. He will be located at the Chicago office of American Cyanamid Company which jointly owns Arizona Chemical with International Paper Co.

He will service industrial users of sulfate turpentine derivatives, and of the "Acintol" line of tall oil derivatives. He has been a salesman with the company since 1953.

AMERICAN WHEELABRATOR

Leslie L. Andrus, Harold M. Miller and **Ray P. Whitman** were elected to the board of directors at the recent annual stockholders meeting. Mr. Andrus, Vice-President of the corporation and executive head of its Dust & Fume Control Division, joined the company's Sales Department in 1934. In 1937, he became Sales Manager and in 1941, Vice-President in charge of Sales.

Mr. Miller has been Vice-President of the corporation since 1944 and a member of the firm since 1923.

Mr. Whitman is first Vice-President of Bell Aircraft Corp., Buffalo, N. Y.

TRUSCON LABORATORIES

Miss Francis, noted color consultant trained in color coordination and styling, has been engaged to provide professional advice to the public through local company paint dealers. She is well know for her ability to select colors that blend with existing furniture and that accentuate the harmonizing effect of drapes and rugs. The first two weeks of the special promotion announcing this expert color service will feature "Paratex Wall Coating" in the 92 new colors now available.

Every day for 36 years the records have been taken at National Lead's Experimental Test Station, Sayville, L. I. . . . the weather, hour-by-hour . . . solar radiation . . . the chemistry of the air . . . the condition of thousands on thousands of paint samples. Today, on 2½ miles of test fence, more than 30,000 exposure tests are active.

FOOLPROOF

your exterior paints with Dutch Boy® "45X"

(Basic Silicate White Lead)

Want an extra leeway of safety against complaints? . . . "Use lead," say makers of exterior paints.

But thousands of exposure panels at Sayville, National Lead's Experimental Station go one step further. They *prove* you need lead for *uniform* performance. Prove, too, that "Dutch Boy" Basic Silicate White Lead "45X" *assures* uniform performance . . . makes exterior paints virtually foolproof, able to handle wide variations in application and service conditions.

In white House Paints, for instance, "45X" insures good self-cleaning. Preserves film integrity, as well.

In tinted House Paints, Dutch Boy "45X" increases film durability and maintains color uniformity.

In Primers, "45X" strengthens adhesion . . . helps keep the bond strong by resisting water.

Paint after paint, it's the same story . . . uniform performance . . . fewer complaints. With "45X," the time and cost of answering complaints goes down. Talk against your paints . . . talk you may not hear . . . fades away. Good will, repeat business comes your way.

Cost is lower, too

You actually need fewer pounds of "45X." For in "45X" the reactive portion of each pigment particle is concentrated at the surface. Pound for pound, *more* lead is available than in other white leads.

No question about it. If you want to cut complaints, step up quality and save money, "Dutch Boy" Basic Silicate White Lead "45X" is the lead to use in exterior paints.

National Lead Company: New York 6; Atlanta; Buffalo 3; Chicago 80; Cincinnati 3; Cleveland 13; Dallas 2; Philadelphia 25; Pittsburgh 12; St. Louis 1; San Francisco 10; Boston 6 (National Lead Co. of Mass.). In Canada: Canadian Titanium Pigments Ltd., 630 Dorchester St., W., Montreal.

NATIONAL LEAD

Allan K. Adams has been appointed Supervisor of paint and vehicle manufacturing for the company. He has held production and administrative positions with The Truesdale Co., The Modene Paint Co., Western Paint Co., Valspar Corp. and Valentine Co.

The following changes have been made in the Trade Sales Department:

R. B. Gilbert has been transferred from the Atlanta to the Chicago Branch as Trade Sales Manager. He was Trade Sales Manager for the Cleveland Branch before transferring to Atlanta in 1950. His company career began in 1928 as a salesman.

W. R. Maschke has been transferred from Cleveland to Atlanta as Trade Sales Manager. He began his company career in 1947 as a paint salesman, and became trade sales supervisor of the Cleveland Branch last year.

Mark Kelly becomes Trade Sales Manager of the Southwestern Branch. He started with the company in 1947 as a paint salesman in West Virginia, moved to Toledo in 1949, and to Buffalo in 1950. He was with Jones and Laughlin Steel Co. and W. J. Hasselman Co. before joining National Lead.

C. B. Winslow has been appointed Trade Sales Manager of the Cleveland Branch. He was employed by U. S. Lines from 1942 to 1949, and Eastern Co. from 1949 to 1951, when he came to National Lead Company of Massachusetts as a paint salesman.

SCHENECTADY RESINS

Clinton A. Braidwood has been named to the newly created post of Director of Development of Schenectady Resins, Division of Schenectady Varnish Co., Inc. He has been Assistant Director of Research since 1952. He joined the company in 1949. From 1945 to 1949, Mr. Braidwood was the Assistant Director of Research on surface coatings at Reichhold. Prior to that he was employed by the United States Rubber Co.

SPENCER KELLOGG

Robert L. Terrill of Snyder, N. Y. has been named Manager of industrial products research. He has been Assistant to Dr. Alexander Schwarcman, Vice-President of the company.

R. L. Terrill

In this position he will be chiefly concerned with new products for the paint industry. He also will direct research on new materials for printing inks, paper coatings and adhesives.

Mr. Terrill joined the company in 1938. He has been active in committee work of technical societies including the American Chemical Society, the American Oil Chemists, the American Society for Testing Materials and the Federation of Paint and Varnish Production Clubs. He is currently national chairman of the Soybean Research Council.

VULCAN STEEL CONTAINER

Dan Donoher has been appointed New York representative, according to an announcement made by Gordon D. Zuck, President.

D. Donoher

Donoher is a graduate of University of Buffalo. He started in the container business in 1940, spent two years in the Chicago area, three years in New Orleans and ten years in the metropolitan New York area. He has had wide specialized experience in the container field and is well known to pail and drum users. He will headquarter in Bloomfield, N.J.

CONTINENTAL BLACKS

Ted A. Ruble, who has been manager of plants at Westlake, La., and Ponca City, Okla., has been made Assistant Vice-President with headquarters at Amarillo, Texas. He will continue to direct the company's research and development program.

speaking of operations...

Let us tell you about *our* operation—a small section of which is shown above. It's the world's largest operation of a complex inorganic chemical process—the manufacture of TITANOX white pigments at Sayreville, N. J.

Bigness is essential in our business for two reasons. First, to keep ahead of your increasing demand for titanium dioxide white pigments in new and established uses. Second, to maintain your preference for TITANOX white pigments—a preference created by TITANOX quality, service and uniformity.

These are two reasons why more TITANOX titanium pigments are sold than all other brands combined. And they're the reasons why so many different industries have discovered that TITANOX is *first choice in white pigments.* Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; Atlanta 2; Boston 6; Chicago 3; Cleveland 15; Houston 2; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 14, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments Limited, Montreal 2; Toronto 1.

2815-A

®TITANOX

the brightest name in pigments

TITANIUM PIGMENT CORPORATION

Subsidiary of NATIONAL LEAD COMPANY

HERCULES

Henry Grace has been appointed Sales Manager of the Cellulose Products Department's Chicago office. **Emmett E. Hixon** has been appointed to a similar position in the company's Detroit office.

Mr. Grace, who for the past two and one-half years has been Manager of the Detroit office, succeeds **Charles A. Grant** in Chicago. Mr. Grant has been named a sales supervisor in the company's Virginia Cellulose Department, with headquarters in Wilmington.

Mr. Hixon will be returning to a branch office sales manager's position after two and one-half years as Service Superintendent of the company's Parlin, N. J., plant. From July, 1951, to June, 1952, Mr. Hixon was manager of Cellulose Products Department's Chicago office.

H. Grace

E. E. Hixon

The following new assignments in the Paper Makers Chemical Dept. have been announced:

P. F. Neumann, Manager of Rosin Size Sales. He has been Manager of Technical Service for the department, for the past nine years. He joined the company in 1937 as a chemist in the Kalamazoo, Mich., laboratory of the PMC department. From 1938 to 1944, he was engaged in sales-service work in the paper industry and then was transferred to Wilmington.

Thomas S. Morse, Manager of Sales Service, paper chemicals. He has been a Sales Supervisor, paper chemicals, for the past six years. He joined the company in 1940 as a chemist and service engineer in Freeman, Ontario. In 1943, he was transferred to the Holyoke, Mass., office of the Paper Makers Chemical Department, as a Technical Service Engineer, and in 1949 moved to Wilmington as a Sales Supervisor.

James K. Farrell, Manager, Product Improvement, paper chemicals. He has been with the company since 1940. He has had experience in research, production, and sales. Mr. Farrell joined the company as a chemist and subsequently was assigned to the Hopewell, Va., plant where in 1946 he became cotton linter sheeting Supervisor. He later was transferred to the Wilmington office of the Paper Makers Chemical Department.

Robert R. Buss, Acting Manager of the Wilmington branch sales office. He has been Assistant Manager of the department's Kalamazoo, Mich., sales office for the past two and one-half years. Mr. Buss joined the company in 1932, in the Kalamazoo office. In 1934, he was named Assistant to the General Sales Manager and was later made a District Salesman.

Due to illness, **J. C. Dieffenderfer,** Wilmington branch office Manager, has been granted a leave of absence.

GENERAL ELECTRIC

Theodore C. Ohart has been appointed Manager of Marketing for the company's Silicone Products Department, it was announced by Dr. Charles E. Reed, General Manager of the department.

Mr. Ohart joined the company in 1929 and completed the firm's advanced engineering course. During its three-year curriculum, he executed assignments in engineering and manufacturing at Schenectady, N. Y.

Following assignments in the Schenectady works laboratory, he did application engineering work in the Lamp Division at Nela Park, Cleveland, Ohio. In 1936, he was responsible for Lamp Division field sales at Schenectady, N. Y. He went on active duty with the U. S. Army in 1940, and was discharged in 1945 with the rank of major in the Ordnance Dept.

After service, he returned to the Lamp Division as its Buffalo district engineer. He was a sales specialist at Nela Park and Lamp Division retail Sales Manager on subsequent assignments. His post as division retail Sales Manager preceded his present appointment.

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PHILLIPS 66 SOLTROL*

ODORLESS MINERAL SPIRITS

DEPENDABLE PERFORMANCE! You are assured of controlled evaporation rates with both Soltrol 130 and Soltrol 170. Soltrol 130 for faster drying. Soltrol 170 for longer wet edge. Yes, you know what you're getting . . . every time . . . because these Phillips products are carefully controlled through all steps of their manufacture to assure uniformity.

DEPENDABLE SUPPLY! When you do business with Phillips you can count on a reliable source of supply and prompt, fast service, too. Soltrols are available in 4,000 or 8,000 gallon tank cars. Or you can order 6,000 gallon compartment cars containing both Soltrols.

FREE TEST SAMPLES

Like to test Phillips 66 Soltrols? We'll gladly send you samples for evaluation. Just tell us how much Soltrol you need to prove to yourself the advantage of odorless Soltrols in your products.

PHILLIPS PETROLEUM COMPANY
SPECIAL PRODUCTS DIVISION
BARTLESVILLE, OKLAHOMA

*A Trademark

BENNETT INDUSTRIES

Robert R. Ernst has been promoted to the position of Assistant General Sales Manager, according to an announcement from Harry Le Pan, Vice President.

R. R. Ernst

Mr. Ernst joined the company in 1952 as a district sales representative for the north central states. He has also been given charge of the firm's advertising and sales promotion activities. He was formerly employed by General Foods Corp. as a Sales Representative for the Maxwell House Coffee Div.

PITTSBURGH PLATE GLASS

Paul A. Ketchum has been appointed Assistant to the President according to an announcement from H. B. Higgins, President.

Prior to his appointment, Mr. Ketchum had been Manager of Trade Sales since 1952. He has been associated with the company for 24 years during which time he has served as Manager of several distributing branches. He also was Assistant General Manager of the firm's Merchandising Div. for seven years.

PACIFIC VEGETABLE OIL

R. B. Huber, Sales Engineer, Boston, Mass., has been appointed representative for the New England area handling all products of the Industrial Oils Sales Div.

SINCLAIR CHEMICALS

John A. Scott has been elected President of the company, petrochemical subsidiary of Sinclair Oil Corp. He has been Executive Vice President and a Director of Sinclair Chemicals since its organization in 1952 and a member of the Sinclair organization since 1934.

J. A. Scott

First employed as a research technologist with Sinclair Refining Co., in Chicago, he has held a number of important research positions and from 1945 to 1951 served as Assistant to the Vice President in charge of Research and Development in New York. When the Petrochemicals Div. was formed in 1951, Mr. Scott was named Manager, and advanced to his recent position with the establishment of the subsidiary a year later.

REICHHOLD

John W. Stevens has been named Vice President in charge of Sales it was announced by Henry H. Reichhold, Chairman of the Board.

J. W. Stevens

M. Pinkerman

Mr. Stevens, who was previously General Sales Manager of the Chemical Div. of the Celanese Corporation of America, will work closely with Mr. Reichhold on sales to major consumers of industrial chemicals as well as firms in the surface coating, plastic, textile, foundry and plywood industries. Before joining Celanese he was with the American Cyanamid Co. in a sales capacity.

Mark Pinkerman, Advertising Manager, was named Vice President in Charge of Advertising and Public Relations.

He had been with the company since 1946. He was formerly an Advertising and Promotion Manager with the Bendix Aviation Corp.

BENJ. FRANKLIN PAINT

Wallace M. Anderson has been appointed to the technical staff and will take charge of the Appliance Division in the Industrial Finishing Laboratory. For the past fifteen years he has been active in the industrial finishing field.

PECORA PAINT

John B. Humphrey has been appointed Chief Chemist, it was announced by William B. Bullock, Chairman of the Board.

J. B. Humphrey

He has been in charge of "Thermoplastic Flooring" and certain tile adhesives at the Flintkote Co. Prior to that, he was with the Bendix Aviation Corp. In his new position, he will assume responsibility for supervision of the company's technical activities in research-development work. He will also be in charge of a staff to maintain quality control from raw materials to finished products.

Mr. Humphrey has already launched a program to improve plant-laboratory liaison. He is also making the home laboratory a "show-place" where customers and potential customers can see the technical progress which the company is achieving.

NUODEX

Arthur Minich has been elected President of the company, a subsidiary of Heyden Chemical Corp., according to a recent announcement. Since 1951 he has been Executive Vice President. He joined the company in 1932 as Vice President and was appointed Vice President in charge of Research in 1943.

Arthur Minich

Simon Askin, president of Heyden, has been elected Chairman of the Board of Nuodex.

KOPPERS

Robert R. Bench has been named Sales Representative for a new sales office opened Mar. 1 in Houston, Texas, by the Chemical Div. it was announced by Leo J. Diamond, Manager of Southern District Sales. The Houston office will be under the supervision of the headquarters office for Southern District Sales in Atlanta, Ga.

Mr. Bench, who was formerly a Sales Planning Engineer, will be responsible for plastics, chemicals, and adhesive sales in the Arkansas-Oklahoma-Texas-Louisiana area. He joined the company in 1952 as a junior Process Engineer at the Kobuta plant.

DU PONT

Joseph B. Dietz has been appointed Director of Sales of the company's Finishes Division, succeeding **Harold R. Lounsbury,** who requested reassignment for reasons of health.

Mr. Lounsbury has been named Manager of Sales Services, a newly created position in which he will direct most of the administrative and service functions of the sales section. This will free the director and assistant directors of sales to devote their time to line and staff selling activities.

With these changes, a series of related appointments in the Finishes Division was announced by the company:

William E. Kreuer, sales Manager for the Boston region since 1950, will succeed Mr. Dietz as Assistant Director of sales, with responsibility for industrial, trade, refinish, export, and specialties sales. **Frank H. Beadles** continues as Assistant Director of sales with responsibility for automotive sales, transfers, and sales development laboratories.

David E. Goldich, Sales Manager for the Chicago region since 1937, will succeed Mr. Kreuer in Boston, and **Dr. Harold E. Goldsmith,** Assistant Director of production for technical activities, will succeed Mr. Goldich as sales manager for the Chicago region. **James S. Allen** will become Manager of the plants technical section, assuming the production responsibilities held by Dr. Goldsmith, and will retain his present responsibility for supervision of process and methods work.

CALENDAR OF EVENTS

April 4-7. Spring Meeting of Div. of Paint, Plastics and Printing Ink Chemistry, ACS, Cincinnati, Ohio.

April 17-20. 46th Annual Meeting of American Oil Chemists' Society, New Orleans, La.

May 6-7. Southwestern Paint Convention of the Dallas and Houston Paint and Varnish Production Clubs. Shamrock Hotel, Houston, Tex.

May 13-14. 8th Annual Convention of Pacific Northwest Paint and Varnish Production Club, Gaffney's Lake Wilderness Resort, Seattle, Wash.

June 26-July 1. ASTM Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

Production Club Meetings

Baltimore, 2nd Friday, Park Plaza Hotel.

Chicago, 1st Monday, Furniture Mart.

C.D.I.C., 2nd Monday.
Cincinnati — Oct., Dec., Mar., May, Hotel Alms.
Dayton — Nov., Feb., April, Suttmillers.
Indianapolis — Sept., Claypoll Hotel.
Columbus — Jan., June, Fort Hayes Hotel.

Cleveland, 3rd Friday, Harvey Restaurant.

Dallas, 2nd Thursday, No Fixed Place.

Detroit, 4th Tuesday, Rackham Building.

Golden Gate, 3rd Monday, El Jardin Restaurant, San Francisco.

Houston, 2nd Tuesday, College Inn.

Kansas City, 2nd Thursday, Pickwick Hotel.

Los Angeles, 2nd Wednesday, Scully's Cafe.

Louisville, 3rd Wednesday, Seelbach Hotel.

Montreal, 1st Wednesday, Queen's Hotel.

New England, 3rd Thursday, University Club, Boston.

New York, 1st Thursday, Brass Rail, 100 Park Ave.

Northwestern, 1st Friday, St. Paul Town and Country Club.

Pacific Northwest, Annual Meetings Only.

Philadelphia, 3rd Wednesday, Engineer's Club.

Pittsburgh, 1st Monday, Fort Pitt Hotel.

Rocky Mountain, 2nd Wednesday.

St. Louis, 3rd Tuesday, Forest Park Hotel.

Southern, Annual Meetings Only.

Toronto, 3rd Monday, Diana Sweets, Ltd.

Western New York, 1st Monday 40-8 Club, Buffalo.

News of Paint and Varnish Production Club Meetings

NEW YORK

George Wormald of DuPont addressing March meeting at Brass Rail Restaurant

Two hundred and fifty members and guests turned out at the March 3 meeting to hear George Wormald of E.I. DuPont de Nemours, Inc, Pigments Div., discuss "Toluidine Red Bloom in Baked Synthetic Finishes." The meeting was held at the Brass Rail Restaurant, 100 Park Avenue, New York City.

Bloom is that dusty, chalky deposit that often forms on the surface of a paint film sometime after it is cured. It is readily distinguished from "hazing" in that bloom can be easily removed by rubbing. The unpredictable nature of toluidine red bloom prompted Mr. Wormald and his associates to investigate the variables in formulation, manufacture, application, curing, and post-handling that might be responsible for this film defect.

A standard formula, consisting of toluidine red, a D.C.O. medium oil alkyd, and urea formaldehyde resin was chosen as a control because it consistently produced a heavy bloom. The results soon established that all commercially available toluidine red pigments would produce bloom in this formulation. The chalky surface deposits were analyzed and identified as toluidine red crystals. Further, all mono-azo pigment dyestuffs that showed bleeding tendencies produced bloom. Variations in the curing cycle produced bloom differences; enamels cured for 30 minutes at 275°F. or lower showed no bloom while those cured at 300° F. or higher bloomed.

Urea-formaldehyde concentrations above 30% on total resin solids produced a bloom while at lower levels no bloom was apparent. In contrast, melamine-formaldehyde at concentrations as high as 40% showed no blooming tendencies.

Blooming is also proportional to film thickness, thicker films give more bloom. Furthermore, blooming was pronounced in those formulations containing drier combinations that would tend to produce top dry at the expense of good through dry. Finally it was found that post-handling with consequent finger-print and perspiration staining encouraged bloom formation.

Mr. Wormald advanced a theory to explain the bloom phenomena. Toluidine red, he maintains, is soluble to some extent in the solvent portion of the wet paint film. High temperature curing, especially in the presence of active top drier, produces a case hardening of the film, leaving solvent trapped in the "dry" film. In the presence of perspiration, or a foul atmosphere, the case hardening is broken through, allowing solvent (and dissolved toluidine red pigment) to migrate to the surface and evaporate. This deposits small amounts of toluidine pigment on the surface of the paint resulting in the chalky appearance, characteristic of bloom. To keep the blooming of baked toluidine red enamels to a minimum, the paint should be formulated and handled with the following principles in view: a soya-modified alkyd is preferred; melamine is the preferred nitrogen resin; sub-surface driers should be used and polymerization inhibitors avoided; solvents should be chosen that exhibit low

solvency for toluidine red; film thickness should be as small as is consistent with good hiding; curing should be done at low temperatures; do not cure or store painted items in a foul atmosphere; keep cured films clean; cool baked films before crating.

Chairman E. Fisher of the Membership Committee announced the election of the following men as members:

Class "A": Anthony J. Page and John Shedko, Johns-Manville Corp.; Charles M. Thompson, A.C. Horn; William L. Cowdrey Jr., Pittsburgh Plate Glass Co.; R.A. Peers Jr., Egyptian Lacquer; Leonard Freund, Farnow Vac.

Class "A" Transfers: Henry S. Haupt, to Roberts Paint; Paul Hess, to General Plastics Corp.; Edward Kubicky, to Valspar; Ben Shandler, to Farnow Inc.; H. Edwin Hamilton, to Keystone Paint.

Class "B": Oliver F. Lane, E.I. DuPont.

LOS ANGELES

The regular meeting convened at Scully's Restaurant attended by 153 members and guests. The meeting was called to order by President Vern Barrett.

Les Houy, Chairman of the Good Fellowship Committee, informed the membership of the passing of George Nagel in Burlingame, Cal. Mr. Nagel had been associated with the Los Angeles Club for many years and was a member of the Twenty-Five Year Club. Houy also reported that John Willis was hospitalized with a broken arm due to an automobile accident.

Ed Campbell, Chairman of the Education Committee, announced that a bulletin had been sent out to all members encouraging greater enrollment in the paint course at the Los Angeles City College. Mr. Campbell stated that a program of greater promotion for this paint course would be forthcoming with the hope of reinstating the day course. President Barrett announced that the Executive Committee is reviewing the work which comprises the course currently offered at the college.

Chuck Finegan, acting in place of the Chairman of the Membership Committee, read the names of the applicants for membership. The following applicants were proposed and approved for Class "A" membership: John Misity, Pittsburgh Plate Glass Co.; Louis Schumann, Paramount Paint and Lacquer Co.

J. C. Remsberg, Oronite Chemical Co., was proposed and approved for Class "K" associate.

President Barrett announced that the plans for the Third Biennial Symposium were being worked on, and that the dates had been set for Mar. 22 to 24, 1956. He urged all the raw material men who travel the West Coast to actively advertise this forthcoming symposium.

The decision to make the office of treasurer an elective line office was announced. George Venatta, Chairman

of the Nominating Committee, stated that it was the custom of the other constituent clubs and the wish of the Federation to have the office of Treasurer held by a Class "A" member and that the floor would be open for moninations. Frank Martin was nominated by the Nominating Committee and was seconded by the membership at large. There were no other nominations and Martin was elected unanimously to the office of Assistant-Treasurer for the current fiscal year.

Dan Heisler, Chairman of the Program Committee, introduced Dr. Alexander Schwarcman, Vice-President and Director of Spencer Kellogg and Sons, Inc. Dr. Schwarcman, was for forty years a member of the technical staff of Spencer Kellogg and is presently the Technical Director, retired. He divided his talk into two parts, the first of which was a description of animal oils and vegetable oils. In the second half he gave a philosophical dissertation upon science. Dr. Schwarcman traced the profound philosophical and mathematical thinking which eventually was evolved as Einstein's Theory of Relativity.

C.D.I.C.

The 347th meeting was held at Suttmillers, Dayton, Ohio, Feb. 14, with 37 members and guests present. Bad weather was responsible for the poor turn-out.

The meeting was called to order by President Robert Lipp. Both the Secretary's and the Treasurer's report were accepted as read.

Jack Winget, in the absence of Elmer Moerschel, gave the first reading on a Class "A" membership application: John Raymond Grosser, Alkyd & Varnish Production, Perry & Derrick Co.

The second reading was given to the two Class "A" membership applications: William R. Lake, Research Chemist, and Robert W. Scott, Formulation Chemist, both of Hanna Paint Co. It was moved and seconded that they both be accepted for membership. Motion carried.

The Technical Committee report was given by Chet Olsen, Hanna Paint Co. He stated that "Emulsion Polymerization" equipment had been transferred from Battelle to their plant, and work would be started in earnest on this year's problem - Polyvinyl Acetate Emulsion Paints.

The meeting was then turned over to Vice President Wm. L. Foy, who introduced F.M. Ball, Eastman Chemical Co., Kingsport, Tenn., who spoke on "One-Half Second Butyrate." The talk was illustrated with colored slides, samples and exhibits. This was followed by a question and answer period.

LOUISVILLE

Fifty-six members and guests attended the Feb. 16th meeting at the Seelbach Hotel.

The Membership Committee, Tom Richie, Chairman, reported on the healthy increase. Homer Flynn's complimentary letter to Richie was read. The names of new applicants also were read. The Technical Committee reported they will advise Homer Flynn for attention of the industry in general regarding the fire hazard when amine catalysts are used with nitrocellulose.

Vice-President Mahorney introduced the guest speaker Dr. Martin C. Londergan of duPont who addressed the membership on "Colored House Paints." He illustrated exposure results with colored lantern slides. The coatings were oil type, alkyd, P.V.A. and acrylic on wood, asbestos shingles, stucco and concrete. The importance of the type and kind of other pigments in the formulation was illustrated as well as the proper pigment volume concentration. Of the tests made PVA emulsion paint gave best results. The oil type was poorest and alkyd somewhat better.

NEW ENGLAND

Dr. W. G. Vannoy of the E. I. duPont de Nemours & Co., Inc. Pigments Dept. spoke to the club on "New Trends in Colored House Paints." Excellent color slides showing the performance of polyvinyl acetate and acrylic emulsions on glazed and cement-coated asbestos shingles were presented, along with slides of colored oil and alkyd exterior paints. Results of the study revealed improved tint retentive properties of the emulsion paints over alkyd and oil paints after exposure periods of nine to twelve months.

Four men were elected to Class A membership: Joseph Urbaneck, Paul H. Swenson, F. Richard Williams, and Howard Jerome.

Howard Cookingham of the D. H. Litter Co. showed color motion pictures of the June, 1954 outing.

NORTHWESTERN

The meeting was held at the Town & Country Club. President Elmer Stark had all former graduates of North Dakota State College introduce themselves in honor of Dr. Woulter Bosch's presence at the meeting.

Chairman of the Program Committee, Mert Hilke announced that the April meeting would feature "Jim Kortum Night" in recognition of Jim Kortum receiving Honorary membership in the Federation of Paint & Varnish Clubs. It will also be Federation night with some officers present to make the award.

John Rouse, Chairman of the Membership Committee, gave the first reading on the name of Dr. Bosch of North Dakota State College for Club membership. The final reading was given for Class "A" membership for the following names: Jim Porter, Colwell Press; John Wiff, Speed-O-Lac Paint Co; J.R. Keller, Western Paint in Duluth; Richard Hough, North Star Varnish. All were voted into Class "A" membership.

Dave Glaser, Chairman of the Methods of Tests Committee, reported that ten different standards of ASTM had been passed on.

President Stark announced that Tom McMahon, an Honorary member, had died.

Mert Hilke introduced Dr. Bosch. His subject was "Paint Research at North Dakota State College, Past, Present and Future." Dr. Bosch discussed several research projects that had been carried on and some that were stil-in progress. Among them were "Heat Polymerization of Sunflower Seed Oil." This oil is in between linseed oil and soybean oil in bodying rate and also in dry in finished varnishes.

Another study was on "The Stress-Strain Properties of Pigmented Alkyds." Dr. Bosch showed the technique used in making this study and demonstrated a very interesting method of casting films on Methocel coated glass plates. This method enables the film to be removed readily for testing.

He also briefly discussed a project on "The Heat of Wetting of Pigments" and showed the apparatus used in this experiment.

Dr. Bosch stated that he would like to have in the future a "Protective Coatings Institute" at North Dakota State College instead of a paint school. This institute would have courses for engineers, and architects as well as students majoring in paints.

CHICAGO

The meeting was held on March 7, at the Furniture Club of America. 164 members and guests were present.

The meeting was called to order by President Ashley. The minutes of the February meeting were read and approved as corrected (the correction being that Jim McClain, not Dr. E. C. Botti, represented the color division of duPont).

For the Membership Committee, F. Levy recorded the following names for the first reading before the club:

Class "A": Robert C. Andrews, The Glidden Co., Nubian Industrial Div.; and Frank J. Gaudio, T. F. Washburn Co.

On second reading, the following people were elected to membership by a unanimous ballot: Herbert W. Gerhardt, Armstrong Paint and Varnish Works; Chester M. Jokot, Lithcote Corp.; William Kersten Paschen, Tamms Industries, Inc.; Joseph B. Brooks, Andrew C. Kurtz, and Joseph Anthony Ellowsky, Minnesota Paints, Inc.; Vincent L. Sahli, Sherwin-Williams Co.; Howard Penn, Reslac Chemicals, Inc.; Oliver D. Manter, Hoeffer Glass Co.

President Ashley asked for a report from the Technical Committee on its project, "A Study of Mildew Preventatives in Paints." Chairman R. R. Pfohl indicated that there will be a meeting soon and work will be started.

The Awards Committee was discussed and there will probably be awards made for laboratory, production, and for outstanding service in general to the paint industry.

President Ashley mentioned a meeting which was held at the Illinois Institute of Technology concerning Research Projects and courses which might be conducted by the Illinois Institute of Technology during the coming year.

The meeting was then turned over to the Program Chairman and Vice President who introduced Dr. Llewellyn Heard. Dr. Heard presented an illustrated lecture entitled "Fire Magic."

Mr. Bruhn announced that the April meeting will be a panel discussion on co-ordination of Laboratory, Production and Management.

CLEVELAND

The influence of free binder on color uniformity in flat masonry paints was discussed by Robert D. Fremgen, a member of the Goodyear Tire & Rubber Company's Chemical Materials Development Dept. The paper was co-authored by Malcolm T. Melester of Goodyear's Chemical Materials Development Dept.

ST. LOUIS

The results of an investigation covering improved color uniformity in exterior masonry paints were revealed here on Feb. 15 by Robert D. Fremgen, a member of the Chemical Materials Development Dept. of The Goodyear Tire & Rubber Co.

Speaking on the "Influence of Free Binder on Color Uniformity in Flat Masonry Paints," Fremgen explained the concept of free binder and its relationship to color uniformity in flat finishes. The paper was co-authored by Malcolm T. Melester of Goodyear's Chemical Materials Development Dept.

SOUTHWESTERN

The 13th annual Southwestern Paint Convention and Industry Show will be held May 6-7 at the Shamrock Hotel, Houston, Texas. The meeting is sponsored jointly by the Houston and Dallas Paint and Varnish Production Clubs.

A well rounded group has been lined up for the technical program: The Dallas club will present a Progress Report; Dick Fortener, of Jones Dabney Co., will speak on "Production Control"; Norman Burdett, of Materials Handling Equipment Corp., will discuss, "Materials Handling Equipment for the Paint Industry"; Gen Kew, of Kinetic Dispersions will speak on "The 'Kady' Mill"; Gil Cain, of Hercules Powder Co., will discuss "Safety in Paint Plants." A guest speaker will be announced.

Witco Acquires Interest In Ultra Chemical Co.

Witco Chemical Co. has recently acquired a half interest in Ultra Chemical Works, Inc., of Paterson, N. J.

Ultra is a large independent producer of industrial and household detergents, wax emulsions and specialty chemicals for the textile industry, and many highly specialized synthetic organic chemicals. Ultra's principal plant is at Paterson, and additional plant facilities are maintained at Joliet, Ill., and Hawthorne, Calif.

The management of Ultra will continue, with no changes in personnel contemplated.

Witco and associated companies now operate 14 plants and 10 sales offices in the United States. The English company, Witco Chemical Co., Ltd., has offices in London and Manchester, with a plant at Droitwich.

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Canadian Chemicals Plant

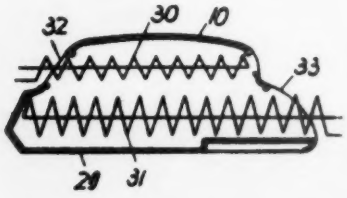
Commercial Solvents Corp. will participate in a Canadian chemical project, it was announced by J. Albert Woods, President. The new company, known as Northwest Nitro-Chemicals, Ltd., will manufacture and market high analysis nitrogen and phosphate chemical fertilizers. The project will be located in southern Alberta.

PATENTS

Complete copies of any patents or trade-mark registration reported below may be obtained by sending 50c for each copy desired (to foreign countries $1.00 per copy) to the publisher.

Drying of Lacquers On Metal Bodies

U. S. Patent 2,702,847. .Constantin A. H. Schmidt, Stuttgart-Bad Cannstatt, Germany.



U. S. Patent 2,702,847

Method for drying coatings of paint, lacquer, enamel or synthetic resin on the outer plating of automotive vehicle bodies by inductive heating, characterized by the fact that at least a part of the induction coils for the inductive heating are movable with respect to the vehicle body and at least a part of the movable coils is introduced through openings present in the vehicle body for doors, windows and the like, transverse to the wall of the vehicle body into the inside of said body.

Water-Resistant Gypsum Composition and Emulsions

U. S. Patent 2,699,414 . . Rexford L. Selbe, Evanston, Ill., assignor to United States Gypsum Company, Chicago, Ill., a corporation of Illinois.

A water-resistant gypsum composition comprising a set mass of interlaced gypsum crystals that are coated with a petroleum base asphalt containing dispersed therein minute paraffin wax particles rendering the coating substantially non-wettable by water, the total amount of said asphalt and wax not exceeding about 15% by weight thereof, the ratio of asphalt and wax being within the range of from about 2 to about 10 parts of asphalt to each part of wax, an alkalinized water-insoluble protein and also a small amount on the order of from about 0.5% to about 4% of the trisodium salt of a trinaphthalene-dimethylene trisulfonic acid.

A water-resistant paper-covered sheathing board having a core consisting of the composition as defined in claim 3.

Synthetic Furniture Finishes Particularly for Kitchen Ware

By B. F. H. Scheifele: Deutsche Farben Zeitschrift, vol. 7, No. 11, pp. 440-442.

Present-day synthetic furniture lacquers can be classified as follows:

1. Air-drying alkyd resin finishes consisting of an air-drying alkyd resin. Characterised by a chemically bonded, drying oil fraction.

2. Air-drying alkyd-urea resin finishes, which in addition to a certain proportion of air-drying alkyd resin, also contain urea resins.

3. The acid-hardening synthetic resin lacquers, which are formulated from hardenable phenol, urea or melamine resins as well as from their combinations and with application, require the addition of an acid hardener or accelerator.

4. The acid-hardening synthetic resin lacquers which consist of combinations of hardenable synthetic resins of group 3 with predominantly non-drying alkyd resins and must be also used with hardeners.

5. The isocyanate lacquers which are prepared by admixture of the two components Desmodur and Desmophene.

6. The Ethoxylene or Epoxy resin lacquers.

In addition, in the furniture industry, considerable use is made of the transition type lacquers, which are formulated from synthetic and nitrocellulose lacquers and are termed combination finishes.

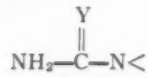
The synthetic resin furniture finishes show the following filming characteristics: rapid filming; rapid drying up to dust and tack-free film; often, rapid through-drying up to end hardness; good adhesion; permanent elasticity and consequently high impact resistance; stability of brilliancy—color tone and weathering; mechanical resistance and particularly considerable resistance to chemical influences such as grease and oils, spirits, etc.

The air drying synthetic finishes of the above groups 1 and 2 give with a high solids content, very full-bodied, brilliant clear and cover finishes which are similar to the drying oil finishes when working with the brush but their chemical resistance do not quite attain the properties of the other synthetic resin finishes. The acid-hardening finishes of groups 3 and 4 give films which are characterised by extreme hardness with sufficient elasticity and with particularly high resistance against oils, fats, and spirits which are scratch resistant, so that these, for example, are suitable for internal application of kitchen ware, where severe service conditions are encountered. Similar filming characteristics are shown by finishes of the groups 5 and 6 which are more expensive.

Fire-Retardant Compositions

U. S. Patent 2,702,283. Ivan V. Wilson, Wakefield, and Ralph Marotta, Malden, Mass., assignors to Monsanto Chemical Company, St. Louis, Mo., a corporation of Delaware.

A fire-retardant composition comprising (1) a water-dispersible, heat-convertible condensation product of an aldehyde and an amino compound containing from 1 to 9 carbon atoms and having the grouping



where Y is a member selected from the class consisting of O, S and N— and where the free valences on the nitrogen atoms are attached to atoms selected from the group consisting of hydrogen and carbon atoms, (2) from 15 to 100%, on the weight of said condensation product, of a water-insoluble reaction product of phosphoryl chloride and ammonia, said reaction product having an atomic ratio of nitrogen to phosphorus within the range of 1.5:1 to 2.0:1, (3) from 20 to 250%, on the weight of said condensation product (1), of a cold-water-insoluble polyhydric compound selected from the group consisting of (*a*) a polypentaerythritol, (*b*) a mixture of a poly-pentaerythritol and unhydrolyzed starch, (*c*) a mixture of a polypentaerythritol, unhydrolyzed starch and hydrolyzed starch, in which the unhydrolyzed starch comprises the major proportion of the starch materials, and (*d*) starch, the weight ratio of starch materials to polypentaerythritol in mixtures (*b*) and (*c*) being between

10:1 and 1:10, and (4) proteinaceous fibers in an amount of 3 to 35% on the weight of said condensation product (1).

Cellulose Coatings

U. S. Patent 2,698,807 . . Annis G. Asaff, Auburndale, Mass., assignor to Callaghan Hession Corporation, Boston, Mass., a corporation of Massachusetts.

A plastic coating composition comprising the water-immiscible gel phase formed by adding to a solution comprising ethyl cellulose and a mixture containing less than 80 per cent by weight of liquid aromatic hydrocarbons and at least 20 per cent by weight of an alcohol selected from the group consisting of methanol, ethanol, normal propanol and isopropanol, water in an amount sufficient to effect a two phase separation.

Polyurea Resins

U. S. Patent 2,699,435 . . Robert W. Auten, Jenkintown, and Robert S. Yost, Oreland, Pa., assignors to Rohm & Haas Company, Philadelphia, Pa., a corporation of Delaware.

A process for preparing polyhydroxypolyalkylene-polyurea-formaldehyde condensates which comprises reacting between about 0° and 100° C. in the presence of water epichlorohydrin and an alkylene polyamine having two to three carbon atoms in the alkylene portion thereof in a mole ratio from 1:1 to 1.4:1 until an aqueous solution of the resulting polyhydroxypolyalkylenepolyamine at a concentration of about 46% has a viscosity from J to Z_7 at 25° C. on the Gardner-Holdt scale, reacting said polyhydroxypolyalkylenepolyamine with urea between 100° and 200° C. in a ratio from 0.5:1 to 1.8:1 of urea per —NH— group of said polyhydroxypolyalkylenepolyamine until an aqueous 45% solution of the resulting polyhydroxypolyalkylenepolyurea has a viscosity from B to Z_3 at 25° C. on the Gardner-Holdt scale, and reacting said polyhydroxypolyalkylenepolyurea with formaldehyde in a solution at a pH between 7 and 9.5.

Fluorescent Whitening Agents

U. S. Patent 2,702,296. .Mario Francesco Sartori, Monroe Park, Del., assignor to E. I. du Pont de Nemours and Company, Wilmington, Del., a corporation of Delaware.

A 3-p-benzamido-phenyl-coumarin bearing in the benzamido nucleus a group of substituents selected from the following group of combinations: one lower alkoxy radical, two lower alkoxy radicals, three lower alkoxy radicals, one methoxy and one methyl radical, and a methylene dioxy radical attached to two adjacent C-atoms.

Anti-Blooming Compound

U. S. Patent 2,702,284. .Marlyn J. Brock, Stow, Ohio, assignor to The Firestone Tire & Rubber Company, Akron, Ohio, a corporation of Ohio.

Method of producing an improved water dispersion paint, which includes the step of incorporating in an aqueous paint containing a non-rubbery, resinous, conjugated diene polymer, a water dispersion of a barium salt of an acid naturally occurring in a fat, said barium salt providing at 25°C. at least 0.0003 gram of barium ions per 100 grams of water in the paint, sufficient of said barium salt being incorporated to supply between 0.01 gram and 2 grams of barium ions per 100 grams of polymer present in the paint, without coagulation of the paint, whereby blooming is suppressed on a dried film of the paint exposed to an ambient atmosphere containing a high relative humidity.

NEWS

James W. Kent Dies; President of Machine Co.

James W. Kent, President of the Kent Machine Works, Inc., Brooklyn, N. Y., died on March 1. He was 92.

Mr. Kent lived all of his life in Brooklyn and it was there, at the age of 14, that he started as an apprentice in his father's blacksmith shop. In 1890 he established a small machine shop, which has since grown into the Kent Machine Works, one of the best known makers of equipment in the domestic and foreign paint, ink and chemical trades.

Although his formal education did not extend past grammar school, Mr. Kent was an avid reader and was well known for his knowledge of machine design and American History. He was also well known for his many acts of charity although he preferred to do them secretly.

In his long life he had known well many of the prominent personalities of the Henry Ward Beecher era, and he would enjoy reminiscing about them with other members of Brooklyn's old Crescent Club.

Mr. Kent retained his great physical strength to a remarkable degree, and up to the age of 91, he was present at the plant almost every day.

The policies he established over many years will be continued by Elmer Peters, Vice President of the company.

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Tall Oil Progress Hailed As Omen of Future

The Tall Oil Association was reassured by its president, Albert Scharwachter of Arizona Chemical Co., that by 1960, tall oil production would reach an annual rate of 300,000 tons. Mr. Scharwachter spoke to the membership at its early Spring Meeting held recently in Key Largo, Fla.

Production in 1954 had approximated 180,000 tons, second only to 1951, with output in the final months of the year running at an annual rate well above previous records. No longer, said Mr. Scharwachter, was tall oil considered as merely a by-product of the sulphate pulp industry but rather as a basic chemical building block being sought after by large chemical manufacturers.

During the past ten years when production of oleic acid, raw linseed oil and peanut oil had stood still or declined, tall oil had enjoyed a 250 per cent increase in production. With annual increases in the production of sulphate pulp from pine wood, the product which was the indirect source of the production not only of tall oil but also tall oil rosin and sulphate turpentine, Mr. Scharwachter said he was more than ever convinced of the correctness of his year-old estimate that tall oil production would equal 1,000 tons per day by 1960. He said he also thought that new trade associations should be formed to promote the use and sale of tall oil rosin and sulphate turpentine.

Formation of a new Pulp Chemicals Association was considered at the meeting. If organized, the group would have a Tall Oil Div., a Sulphate Turpentine Div., a Tall Oil Fatty Acids Div., and later possibly a Tall Oil Rosin Div.

NEWS

National Starch Plans Modernization Program

Frank Greenwall, President of National Starch Products Inc., has announced company plans to enter immediately upon a long range program for the expansion and modernization of all manufacturing and research facilities.

The plan calls for the expenditure of $3,500,000 and will provide for the following:

1. New and modernized equipment to be installed at the Plainfield, Chicago and San Francisco plants, in order to improve adhesive manufacturing facilities.

2. Expansion and modernization of buildings and equipment at the Indianapolis plant, which will substantially increase the present starch grind, as well as the capacity for making unique specialty starches.

3. Alexander Research Laboratory, Plainfield, N. J. to be doubled in size, in order to consolidate and coordinate all starch, resin and adhesive technical and research efforts in the east.

4. Equipment improvements to permit more efficient manufacture of new resin products introduced in the last several years.

The company recently announced plans to erect a second vinyl resin plant at Meredosia, Ill., to manufacture vinyl acetate polymers and copolymers. This new plant is expected to be in operation this summer. National's vinyl resins are used principally in the paint, packaging, textile, woodworking, paper and related industries.

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"Darco" Sales Moved

Sales headquarters for its "Darco" activated carbons has been transferred from New York City to Wilmington, Del., it was announced by Atlas Powder Co.

Dr. Holmes J. Fornwalt, who was a sales representative in the New York office, became manager of sales in Wilmington at the time of transfer.

RESINOUS POLYOL

(*From page 29*)

EFFECT OF VARIABLE BAKING TEMPERATURES AND TIME ON DOW RESIN 622 SOYA FATTY ACID ESTER* FILM PROPERTIES

BAKING TEMP.	BAKING TIME	% SWARD HARDNESS	1/8" MANDREL FLEXIBILITY	5% NaOH (HOURS TO FAILURE)
250°F	15 MIN.	11.4	NO CRACKS	4
	30 "	14.8	" "	23
	45 "	17.2	" "	28
	60 "	17.2	" "	52
	120 "	22.8	" "	120
300°F	15 MIN.	23.0	NO CRACKS	23
	30 "	23.0	" "	48
	45 "	25.7	" "	72
	60 "	25.7	" "	80
350°F	15 MIN.	22.0	NO CRACKS	120
	30 "	23.0	" "	120
	45 "	26.0	" "	150
	60 "	31.4	" "	150
400°F	15 MIN.	48.5	NO CRACKS	170
	30 "	63.0	" "	360
	45 "	68.5	" "	>45 DAYS
	60 "	80.0	" "	>45 DAYS

*ESTER COMPOSITION	% WT.
DOW RESIN 622	43.5
SOYA FATTY ACIDS	56.5

DRIERS: 0.5% Pb, 0.05% Co (METAL/VEHICLE, NON VOL.)

Table VII

at the higher baking temperatures, in the face of a marked increase in hardness. This suggests its potential use in chemical-resistant can coatings where stamping and forming properties are extremely important. For greater alkali resistance at corresponding bake schedules, dehydrated castor oil fatty acids are recommended. Films in 5% caustic last approximately twice as long as the soya fatty acid counterpart.

Although the data presented in this paper were based largely on the fatty acid esters of Dow Resin 622, recent laboratory work has shown that clear, compatible vehicles can be prepared by direct reaction of drying oils with Dow Resin 622.

A laboratory method consists of heating Dow Resin 622 and a drying oil to 240°C with agitation under an inert atmosphere. When this temperature has been attained a small amount of alcoholysis catalyst is added (PbO, CaO or calcium acetate, 0.05-0.2% based on the polyalcohol). Within five to ten minutes a clear "pill" is obtained. The evaluation of the resulting film properties has not been completed.

It is believed, on the basis of general film properties and certain specific applications investigated that this new resinous polyalcohol will be of interest for the production of superior finishes at a favorable cost level to meet some of the urgent needs of the industry. Let us summarize the major reasons presented here tonight concerning why Dow Resin 622 will be of interest to the paint and varnish technologist:

(1) Rapid esterification at relatively low temperatures.
(2) Excellent solution and film color.
(3) Excellent solubility in aliphatic solvents.
(4) Fast drying.
(5) Excellent alkali and water resistance.
(6) Excellent adhesion, abrasion and impact resistance.
(7) Good durability.
(8) Reasonable Cost.

These general properties suggest a broad range of ultimate uses among them floor finishes, porch and deck enamels, spar varnishes, maintenance paints, chemical-resistant finishes and industrial primers. Preliminary indications are that superior finishes in these fields and others are in range with Dow Resin 622.

TECHNICAL Bulletins

FILTER PRESSES

"Shriver Filter Presses: A Guide to Better Filtration" is a 28-page, well illustrated and diagrammed booklet.

Among the topics discussed are, "Selection of Filter Presses";"Comparison of Filter Plate Types"; "Method of Slurry Feed"; "Method of Filtrate Discharge"; "Washing the Filter Cake"; "Location of Feed and Discharge"; "A Few Common Types of Filter Plates"; "Drainage Surface of Plate";"Control of Leakage"; "Plates for Control of Temperature"; "High Pressure Filtration"; "Materials of Construction"; "Closing Devices for Filter Presses," etc.

Booklet is available from T. Shriver & Co., Inc., 810 Hamilton St., Harrison, N. J. Ask for catalog No. 55.

PAINT SPRAY BOOTHS

Paint spray booths are illustrated in a 4-page folder put out by the Van-Truer Co., Inc., 12600 Beech Rd., Detroit 23, Mich.

Diagrams and explanation deal with, "Equalized Air Velocity Over Booth Face"; "Six Separate Washing Stages"; "Dual Moisture Eliminator"; and "No Nozzles to Clog."

HOSE, DUCT ACCESSORIES

Useful accessories facilitating installation of Flexaust hose and Portovent duct for industrial applications are described in illustrated Bulletin No. 41, "Accessories and Installations," published by The Flexaust Co., 100 Park Ave., New York 17, N. Y.

TEMPERATURE CONTROLLER

Performance specifications, application ideas and a complete description of a new liquid-filled, remote indicating temperature controller, are presented in a two-color brochure, (MC-122), available from the manufacture, Fenwal Inc., Ashland, Mass.

CARBON DIOXIDE

"CO_2: Applications Unlimited," a colorful, 16-page booklet describing the many uses to which carbon dioxide is now being put in industry, has recently been published.

Included are sections on "White Lead"; "Paint Packaging"; "Paint and Varnish Manufacture"; and "Phenol."

Copies are available upon request to: The Liquid Carbonic Corp., Advertising Dept., 3100 South Kedzie Ave., Chicago 23, Ill.

RESIN DISPERSION

A technical, preliminary report on the use of "Dresinol" resin dispersions in emulsion paints is available from Hercules Powder Co., Wilmington, Del.

Studies include butadiene-styrene paints, paints based on polyacrylics, and primer-sealer paints based on butadiene-styrene latex.

INDUSTRIAL CHEMICALS

An alphabetical list of "Harshaw Industrial Chemicals" has been issued in a 21-page illustrated brochure, and may be obtained by writing to the company's general offices at 1945 East 97th St., Cleveland 6, Ohio.

The list covers the following industrial chemicals in which the company has major activities: electroplating salts, anodes and processes; performed catalysts, catalytic chemicals; fluorides; driers and metal soaps; cadium pigments; ceramic opacifiers and colors; vinyl stabilizers; synthetic

optical crystals; chemical commodities; glycerine; agricultural chemicals; laboratory apparatus and chemicals from Harshaw Scientific.

Included are the addresses of sales branches and warehouses, plants, and those of Harshaw Scientific, Division of the Harshaw Chemical Co.

WET GROUND MICA

Technical bulletin No. 19 is entitled, "The Use of Wet Ground Mica in Vinyl Acetate Co-Polymer Latex Paint—Part II."

The bulletin has an introduction, a list of paints used and the tests given. Six tables, included under the tests, list: The base formulation used; Comparison of various micas and extenders on the electrical resistance of water (table also lists pH variations during the tests and pH of completed paints after 15 days of storage); Behavior of the test paints in ultraviolet light exposure—using twin arc weather-ometer without water spray; Washability of the test paints; Washability of the test paints on glass (continuous double-strokes); Removal of stains from test paints on glass and visual appearance after 500 double-strokes (paints dried after each 100 double-strokes). A summary closes the report. Wet Ground Mica Association, Inc., 420 Lexington Ave., New York 17, N. Y.

BUTYL BENZOATE

A 4-page technical bulletin, F-8109, describing n-Butyl benzoate has been released by Carbide and Carbon Chemicals Co., a Division of Union Carbide and Carbon Corp. Information is given on its properties; shipping container contents; resin solubilities; and its applications as a solvent, as an extractant, and as an intermediate for benzoate esters and alkyd resins.

Copies of the bulletin are available from Carbide and Carbon Chemicals Co., 30 East 42nd St., New York 17, N. Y.

INDUSTRIAL TRUCKS

The bulletin suggests uses of the hose and duct particularly for installations where walls, beams, posts, and machinery must be detoured and convenient, flexible and economical hose or duct is needed for purposes of ventilation or of moving liquids, gases, dusts and light solids.

A data file describes the weight, flexibility and caster advantages of the company's aluminum industrial trucks.

Other features described are torsionally flexible construction, and exclusive Magcoa Tobey lifetime-lubricated casters with big Timken tapered bearings spaced far apart for freedom from binding.

The data file includes specifications for the various sizes and styles of flatbed, multiple-deck and "A" frame trucks in the line as well as information on removable sides, ends and other accessories.

Copies are available on request from Magnesium Company of America, Tobey Aluminum Div., East Chicago, Ind.

PACKAGED PILOT PLANT

A product data sheet on its 5-gallon distillation pilot plant is offered by Patterson-Kelley Co., Inc., East Stroudsburg, Pa.

Consisting of a reactor, agitator, condenser and decanter, this standard unit can be used to study hundreds of chemical processing operations.

Included in the data sheet are specifications on component parts, electrical controls, and the cooling and heating systems.

SURFACE ACTIVE AGENTS

A completely revised, folder, No. 220, on its line of "Monamine Surface Active Agents" has been issued by Mona Industries, Inc., Paterson 4, N. J.

"Monamines" find valuable application in a variety of industries, including paint, rubber, paper, leather, fur, metal, petroleum, glass, cement, textile, insecticide, drug and cosmetic, cleaning and others.

The folder contains detailed specifications on basic grades, as well as chemical physical and physiological properties on the entire line. Furthermore, complete information is given on use and compounding and a special sheet with suggested formulations on various types of cleaners and cosmetic preparations is available.

LABORATORY DIRECTORY

The American Society for Testing Materials has just published its "Directory of Commercial and College Testing Laboratories."

The Directory lists the locations of testing laboratories equipped and prepared to undertake testing on a commercial or fee basis. Information is given concerning 278 commercial testing laboratories and their 151 branches or offices. There is also presented a list of the laboratories of 86 colleges that are prepared to do testing under certain conditions. Research and consulting laboratories are not listed unless they also are engaged in testing on a commercial basis.

Copies may be purchased from the American Society for Testing Materials, 1916 Race Street, Phila. delphia, 3, Pa. Price $1.00

PAINTING SPECIFICATIONS

"Dutch Boy's" Standard Guide Specifications 1955 for the painting of structural elements introduces a simplified tabular form for quick reference and easy use by contractors, architects and engineers. The Guide, which appears in the current Sweets Architectural File—Section 14/Nat, covers description, use, specifications, formulas and application of the complete line of company paints, enamels and varnishes. New method of specifying paint saves writing, reduces errors, assures that the painting contractor follows instructions.

Also, in order to shorten transcribing, company is making available extra copies of the General Conditions and Description of Coats Tables, ready for keying to building specifications. For samples, together with a copy of the Guide, address: National Lead Co., 111 Broadway, New York 6, N. Y.—Room 1815.

MOLYBDENUM

A 3-page bulletin, CH-6 "Manufacturers of Molybdenum Chemicals," has been published by Climax Molybdenum Co., 500 Fifth Ave., New York, to aid purchasing, production and research personnel in finding sources of molybdenum chemicals.

Grouped into a dozen classes and listed by formula, chemical name and suppliers are all molybdenum chemicals reported to be available in either commercial or experimental quantities. Names and addresses are given both for manufacturers and for companies prepared to make given molybdenum compounds on special order. Also indicated are companies which may be interested in making molybdenum chemicals not listed.

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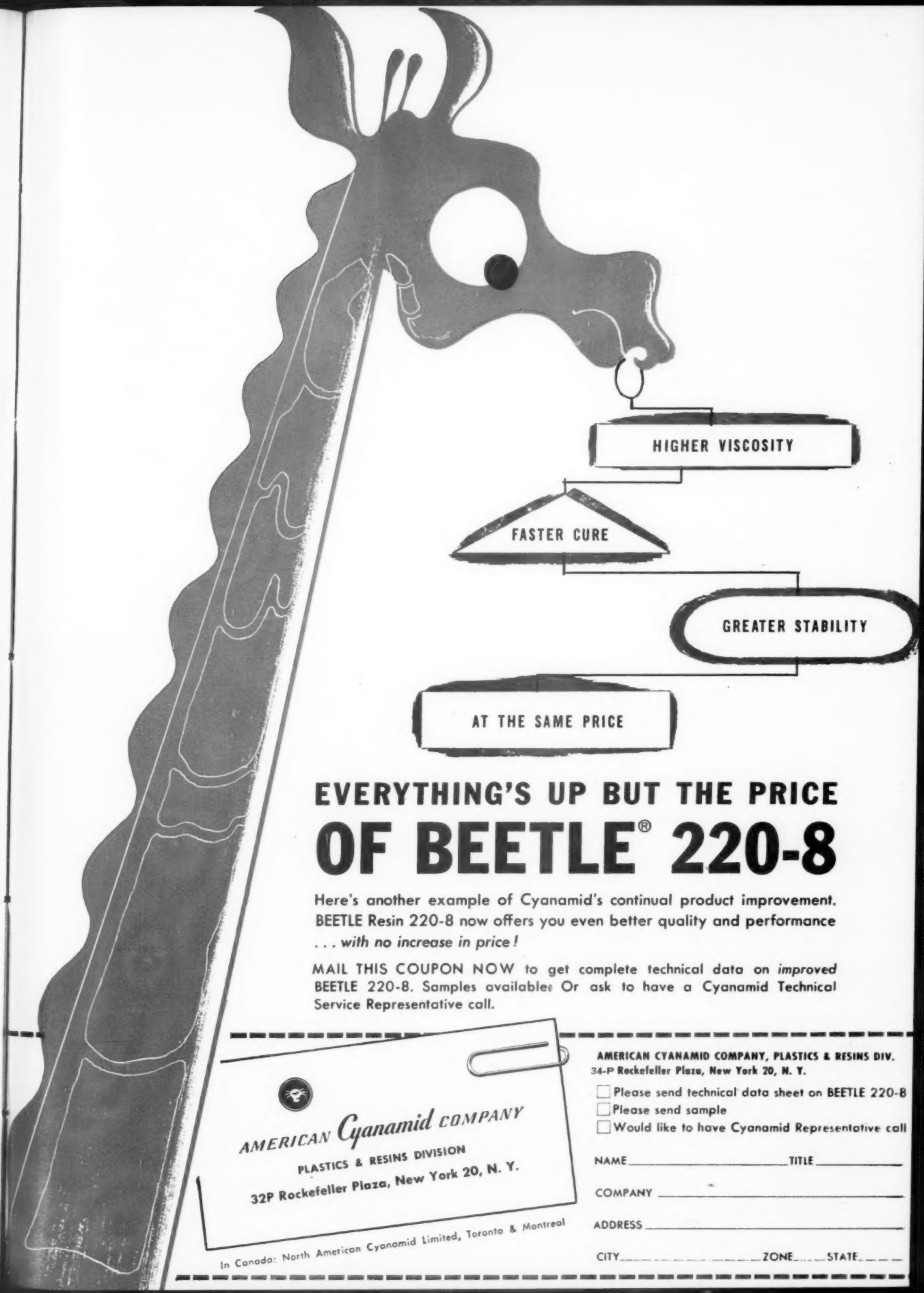

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How HYDRITE Kaolinites affect the HIDING POWER of Polyvinyl Acetate Emulsion Paints

HYDRITE Kaolinites impart an exceptional degree of dry hide to polyvinyl acetate emulsion paint systems. The amount of dry hide contributed depends largely on the particle size distribution of the individual Kaolinite. It is not significantly affected by the individual PVAc emulsion as is gloss (see advertisement #5 in this series).

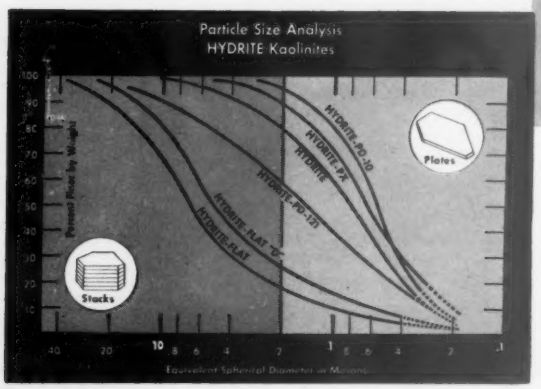
Curves at the right were obtained using different grades of HYDRITE Kaolinite in typical PVAc formulations. Pigmentation was varied as shown in table below to effect differences in PVC.

Major Non-Volatile Ingredients	25% PVC	35% PVC	45% PVC	Spreading rate approximately 400 sq. ft/gal
	lbs./gallon			
TiO2 (rutile, non-chalking)	2.5	2.0	1.5	
Kaolinite	0.3	1.2	1.8	50% non-volatile
PVAc Solids	2.5	2.0	1.5	

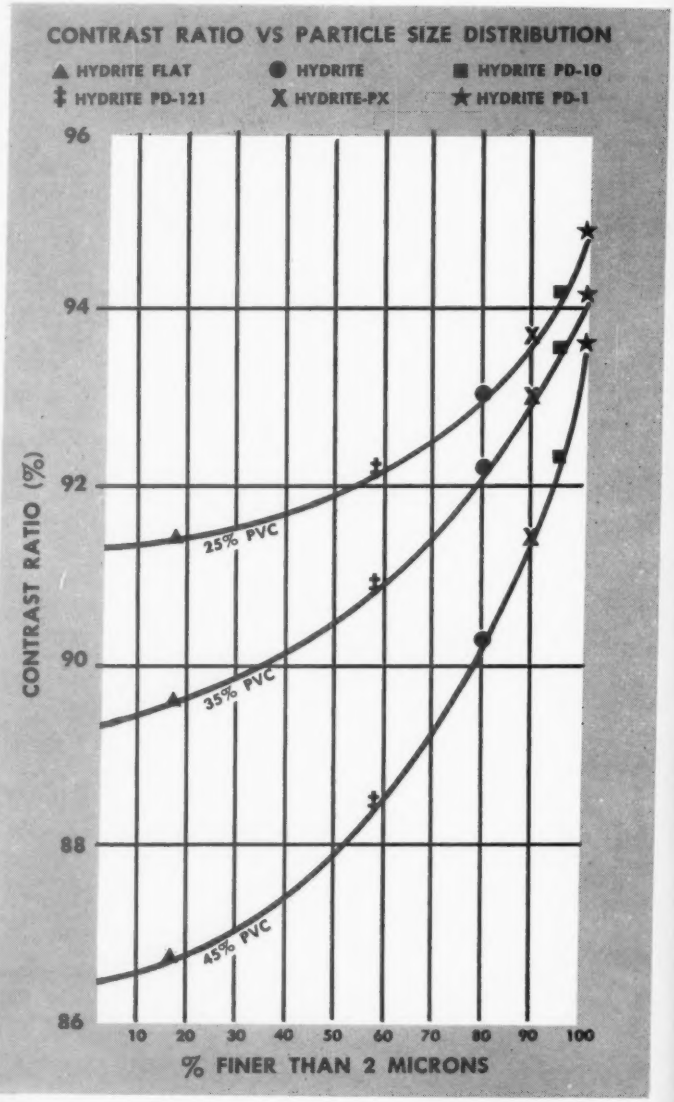
Data presented in the graph and the table show that a judicious choice of kaolinite particle size gives the formulator several avenues for increasing dry hide without adding prime pigment or for holding dry hide constant and reducing the amount of prime pigment.

Technical Service Bulletin TSBH-12, giving further details, is being prepared.

WRITE NOW TO RESERVE YOUR COPY!



#6 in a series describing the effect of kaolinite particle size on important properties of various paint systems.



GEORGIA KAOLIN COMPANY

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